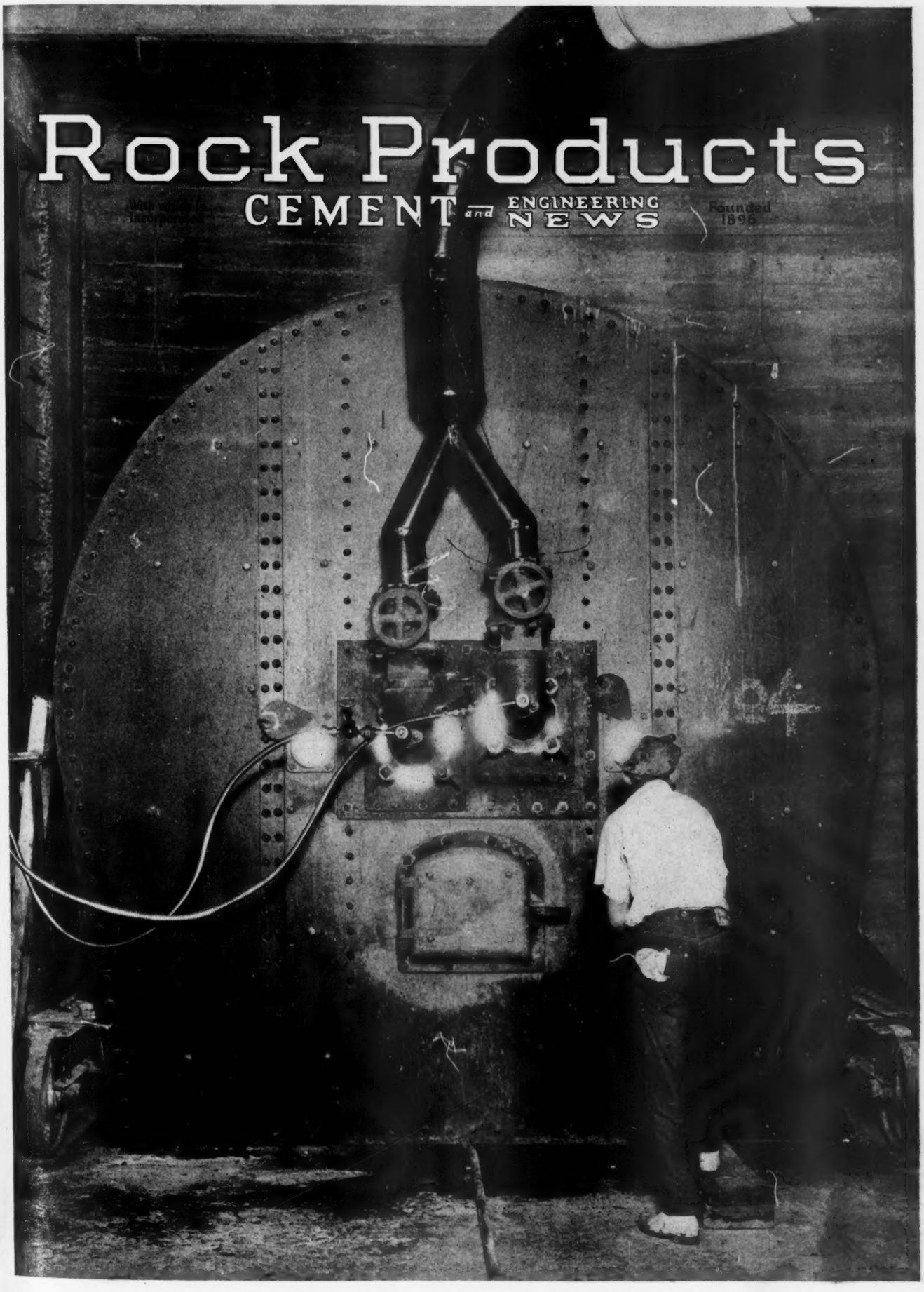
Volume XXXI Chicago, September 15, 1928 Number 19

# Rock Products

## CEMENT and ENGINEERING NEWS

With which is incorporated
Founded 1896



*One of the oil-fired kilns of the Southwestern Portland Cement Co., at Victorville, Calif.*

# The Victorville Plant, Southwestern Portland Cement Company

## Keeping a "Show" Plant of 12 Years Ago a "Show" Plant to Date

James N. Hatch
Pasadena, Calif.

THE VICTORVILLE PLANT of the Southwestern Portland Cement Co. has always been one of the "show" plants of the United States. It was the pride of the late Carl Leonardt. It was also his pride, and the pride of his successor, Frank H. Powell, to keep this plant a "show" plant. Consequently, though the original plant is 12 years old, the plant as a whole will rank with the newest ones in efficiency and good looks.

The plant was put in operation in September, 1916, with one raw mill, one finished mill and one rotary kiln. Since that time it has been continually enlarged until it now has five complete units and is operating at a capacity of 6000 bbl. per day. It has been the policy of the company to install the most improved machinery in keeping with the development of the art. This is shown in the new machines that have been installed from time to time, especially in those installed in 1926-27. Also, improved methods are exemplified in the auxiliary equipment, which is being continually changed to cut down labor costs, to conserve fuel and power and to improve the output. This plant is also as near dustless as most the newer ones. Dust collectors equipped with suction fans are placed everywhere where dust is given off, and the dust collected is returned to the place where it belongs. Even the vapor from the chimney has had the dust precipitated from it in large dust chambers, and as it leaves the chimney-top is nothing but steam. This is a wet-process plant and a plentiful supply of water for all purposes is obtained by pumping from deep wells near the river.

The layout of the plant shows very careful planning, so the materials from raw ingredients to finished products follow a logical sequence through the plant. The buildings and structures are all of concrete and are of heavy construction, substantially built and fireproof throughout. The original layout was so well planned that the additions to buildings to accommodate new machinery have not marred the architectural effect. In fact, the buildings as they are today appear to have been built all at the same time, and are of an imposing appearance.

*Frank H. Powell*

Ample room has been allowed for the machinery and it has been carefully lined up to give the best appearance, and allow the most efficient operation. All moving parts are as far as possible protected by guards to prevent injury to operators. Emergency electric push-buttons are located throughout the plant so that any section of the plant can be shut down instantly in case of emergency by pushing a nearby button.

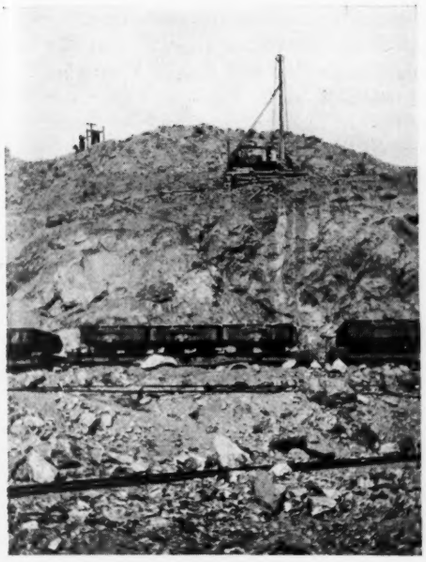
Neat concrete cottages are provided for the Mexican laborers, where they may live with their families, and small sleeping quarters are maintained for unmarried men that wish to stay on the grounds. There is also a splendidly equipped club house with a large lounge and dining room for officials and visitors. Near the club is a tennis court and recreation grounds.

### *Quarry and Rock Haulage*

The quarry is located in the hills about 6½ miles northeast of the mill. The company owns about 440 acres of quarry land containing an indeterminate amount of usable rock. It has its own standard-gage railroad and railroad equipment and operates its own rock trains. The railroad, which is known as the Mojave and Northern, climbs a heavy grade from the mill to the quarry. At the quarry there is between two and three miles of switch-track, and it is contemplated adding nearly a mile more in extending the quarries. The quarry is divided into two workings designated as Quarry No. 1 and Quarry No. 2. All switch track is very easily accessible from the main line so that trains can be made up with a minimum of delay.

*Loaded train of rock leaving the quarry at the Southwestern Portland Cement Co. plant for the mill*

The railroad equipment consists of three 60-ton Davenport saddle-tank locomotives and one 40-ton Porter; thirty-seven 30-ton, steel rock cars each equipped with three 10-



*Churn drilling in Quarry No. 1, with a train of dump-skip cars in the foreground*

ton dumping skips of the company's own design; two dump cars and one flat car. The excavation equipment is of the most modern design. The company has lately done away with the operation of steam shovels in favor of electric power shovels. It now has one Marion electric power shovel with a 3-yd. bucket and one Bucyrus electric power shovel with a 2½-yd. bucket. The electric shovels are both on crawler treads. One of these has been in operation over a year and the other several months. Several steam shovels are owned by the company, but are not used in normal operation. While steam shovels are said to be somewhat faster than electrics, and can be moved long distances more easily, it is proved that electric machines are more flexible and efficient in these quarries, and for several reasons are more desirable. Being on caterpillar or crawler treads, they do not need tracks, which does away with a number of pit men. Also they do not use oil and water which is important, as both must be hauled in tank cars from the mill.

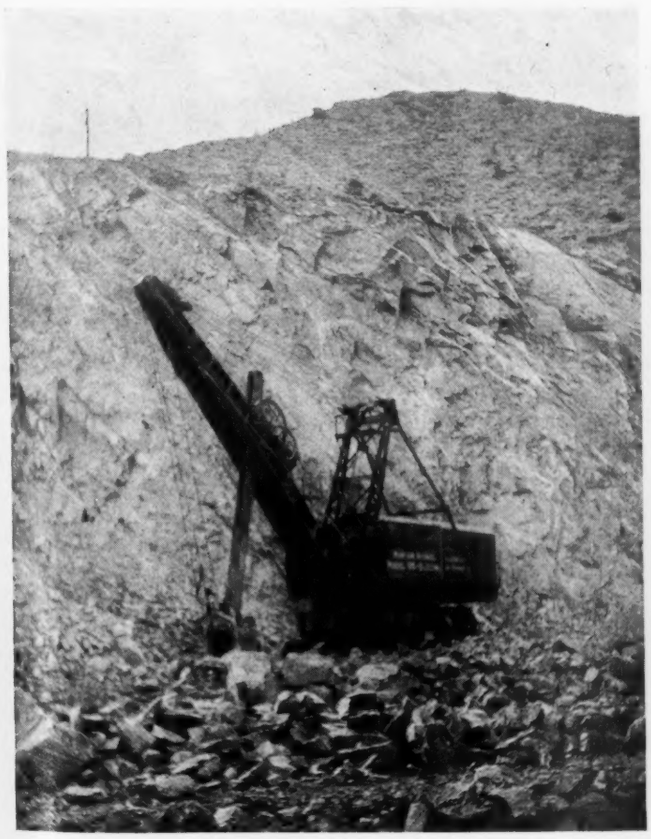
One feature of this quarry is that all materials required for making cement, except gypsum, can be obtained from the same quarry floor. No separate shale quarry is necessary. The material as quarried runs, high lime, low lime and silica, depending on what part of the quarry it is taken from. The low lime has an admixture of shale furnishing the necessary clay. The silica is obtained from quartzite dikes, which are found in sufficient amount for the requirements. So the quarry sends to the plant the three materials in approximately the proportions that the mill demands, all obtained from the same floor.

Holes are put down parallel to the face, 6 in. in diameter, drilled with an Armstrong

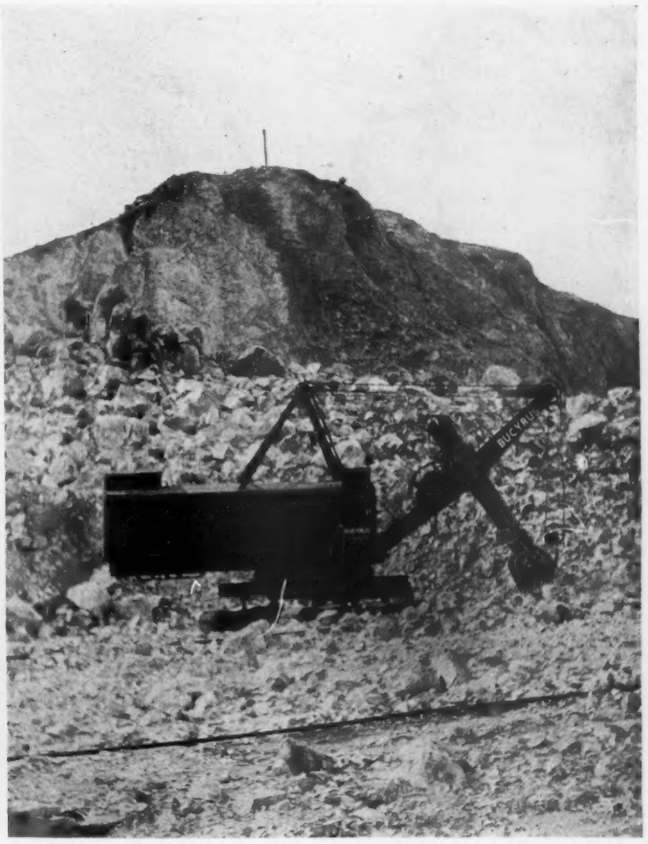
*One of the three tunnels entering the face of Quarry No. 2 to connect with the lateral tunnel*

electrically driven well drill. These holes may vary in depth from 20 or 30 ft. to as much as 140 ft., depending on the contour of the ground. One shot was made recently using 43 holes and required 15 tons of powder, breaking down approximately 120,000 tons of rock.

There is now being prepared a tunnel at



*Electric shovel loading rock in Quarry No. 2, near where the blasting tunnels are being driven*



*Loading rock by electric shovel. The pile in the rear contains over 100,000 tons of rock*

Quarry No. 2 which will eclipse anything previously done in the way of blasting at these quarries. Three tunnels are being driven at right angles to the face of the quarry about 100 ft. apart and 70 ft. long. From the ends of these 70-ft. tunnels laterals are being driven about 50 ft. long parallel to the face. This will give practically a continuous tunnel parallel to the face and 70 ft. back, 300 ft. long. Pockets are made in these laterals about 22 ft. apart in which the charges of powder will be placed. About 40 tons of powder will be required for this shot and it is expected that it will throw down 350,000 tons of rock. The depth of ground over the lateral tunnels is about 135 ft. The powder used is 20% granular powder made by the Giant Powder Co.

The rock thus thrown down that is found in pieces too large to handle is again drilled with jackhammers and blasted. The company also has an Ingersoll-Rand, Burley type tripod air drill which will drill holes 2½ in. in diameter and 25 ft. or more deep. This is used where there may be a large projection that the main blast did not loosen properly.

The company is putting down prospect holes in a new section to the north of its present No. 1 quarry and is opening this up and building approximately a mile of new siding this year.

### *Unloading and Storage*

The rock is sent down to the mill in trains of seven 30-ton cars. The capacity for delivering rock to the mill is about 2200 tons per 8-hour day. Normally the quarry operates eight hours per day, six days per week, and stores enough rock in that time to keep the mill running 24 hours per day, seven days per week. The quarry employs about 40 to 50 men. These men go to the quarry on a special train leaving the mill at seven o'clock each morning.

The company has lately purchased a new quarry site of about 100 acres located twelve miles east of the mill on which there is an abundance of suitable material for the manufacture of white cement. A right-of-way has been obtained to this new site, which follows the present road for about three miles and then branches off across the desert to a range of hills to the east. It is planned to build this road in the near future and then operate both quarries.

The 7-car trains of rock are taken from the quarry down to the mill and pushed up an inclined trestle to an elevation of about 30 ft., into the crusher building. Here the locomotive is uncoupled and backs down to the bottom of the trestle, where it picks up an empty train and returns at once to the quarry.

In going up the trestle to the crusher building the locomotive pushes the cars ahead of it and leaves the train so that the last skip on the last car next to the locomotive stands opposite the receiving hopper, and the remaining cars are on the level trestle beyond. On the roof over the train shed is located a hoist with a crane hook hanging down through a slot in the roof. This hoist is operated by an operator on the floor near the receiving hopper, who lowers the hook under the side of the skip, and as the hook is raised the skip is tipped up until the rock contents fall out into the steel-lined receiving hopper and thence into the primary crusher. The same operator also spots the cars to the receiving hopper as fast as each car is dumped. This is done by means of a small cable car with an electric haulage. When the cars have been pushed back until the last car is unloaded, the train is then standing on the incline. A man then releases the brakes and the train runs by gravity, down off the trestle, and is switched to a siding so that the next incoming loaded train can pass.

The primary crusher is a 48-in. by 60-in. Allis-Chalmers jaw crusher, driven by a 250-hp. Westinghouse, a.c., 440-v. motor. The rock as received runs to a size of about 4-ft. cubes. The normal capacity of the unloader and crusher is about seventy 30-ton cars per 8-hour day. Over the crusher is a

***In the crusher building, showing hook dumping one car to the receiving hopper. The operator dumps the cars and also operates the cable to the pusher car which spots the cars as required***

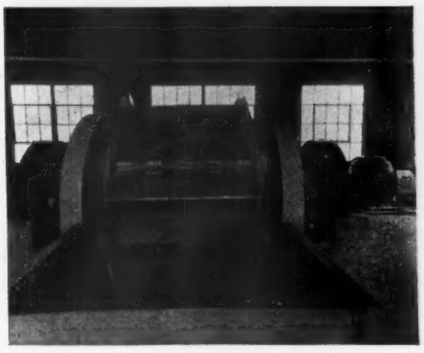
10-ton hand-operated traveling crane with an air hoist. This can be used for dismantling machinery, or as is occasionally necessary for turning a rock over in the hopper, which has become lodged or is too large to go through the crusher. There is duplicate hopper, crusher and hoist in the next bay of the crusher building which can be put into service in case it is necessary to shut down the other one. On the post beside the operator is an emergency push button, which will stop all machinery in this department within a 10-ft. movement, in case of any foreign matter getting into the crusher.

The primary crusher breaks the rock down to a size of about a 10-in. maximum dimension. The crushed rock is then taken by a Stephens-Adamson bucket elevator, having 5-cu. ft. capacity buckets, and discharged into a Robins "Cataract" roller grizzly. That which goes through the grizzly is conveyed directly to rock storage. That which goes over the grizzly is fed into a No. 9 "Jumbo" Williams hammer mill which crushes it down to about 1½- to 2-in. diameter, and is then combined with the material that had passed through the grizzly and elevated by a Stephens-Adamson bucket elevator similar to the one from the primary crusher. This bucket elevator is provided with a safety brake on the driving shaft which will not allow the shaft to turn backward. In case of power interruption the shaft would instantly stop and prevent the elevator from running backwards under load.

***The elevated trestle at the plant, showing a locomotive pushing a train of rock cars into the crusher building***

From the top of the elevator the rock is discharged either into rock bins or to a 30-in. belt conveyor, which runs over the top of the rock storage pile. A tripper on this belt conveyor is set to discharge the materials to any desired point in the storage pile. The different grades of materials, high-lime, low-lime, etc., are kept separate so far as possible so that they can be drawn off in the proportions required at the mill. The silica is placed in one of the rock storage bins and not in the main storage pile. This rock storage holds enough material for 100,000 bbl. of cement and acts to equalize the operation between the mill and the quarry. If for any reason the quarry should be shut down for several days the storage would keep the plant running. Or if the plant were being operated at a reduced capacity for several days the quarry could continue to operate for storage.

Beneath the storage pile are two tunnels, each equipped with a 22-in. belt conveyor. The crushed rock is loaded on these belt conveyors from any one of a number of gates. As was said, the materials in the storage pile are segregated according to the grades of material. From this point, a chemist has charge of selecting the materials as they are drown off on the belt conveyor.



***Top of the elevator from the hammer mill to the rock storage, showing automatic brake***

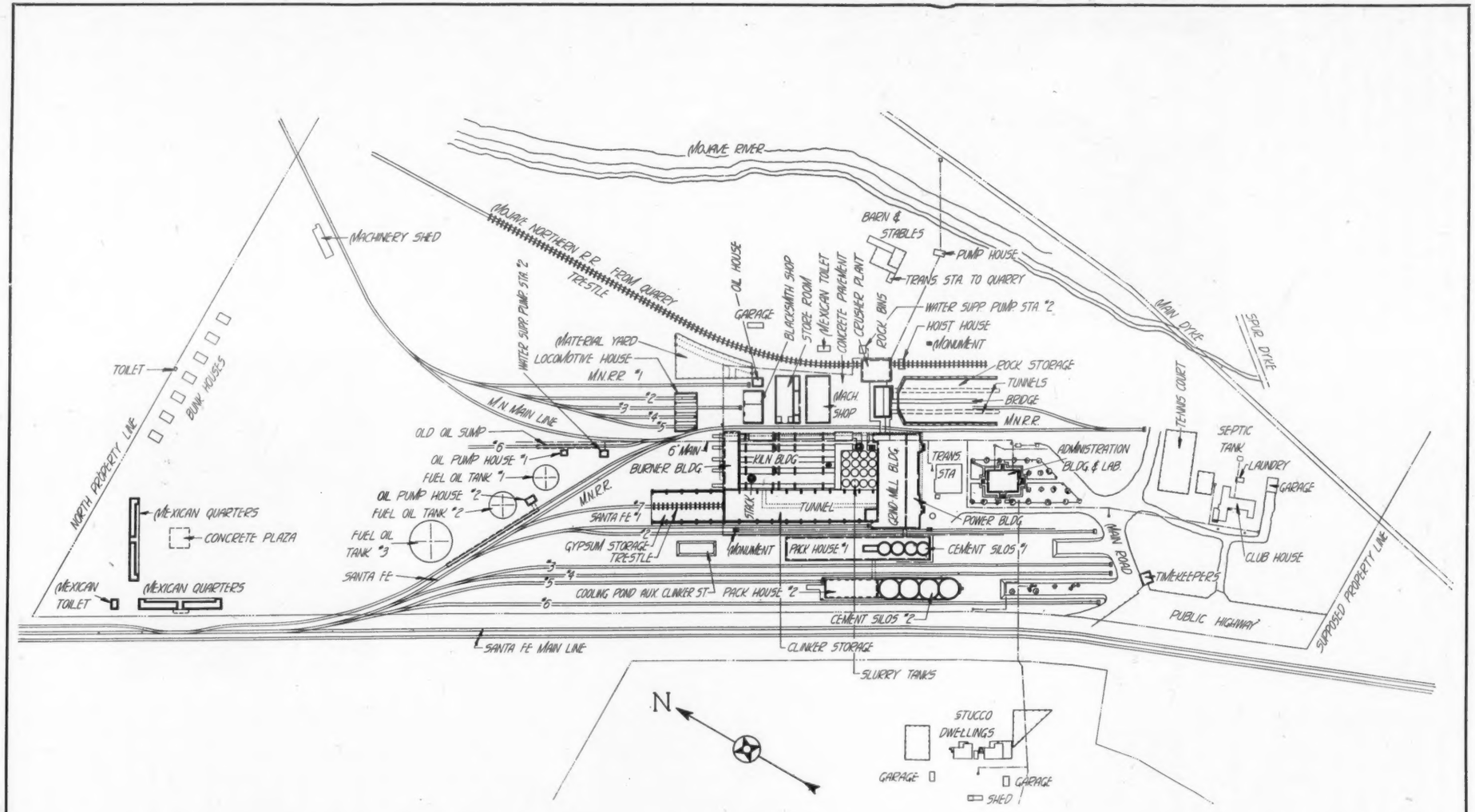
He directs how much of the different grades shall be taken. In this way the materials as taken from storage are approximately in the right proportion for the raw mix. The belt conveyors bring the materials back to the crusher building, where they are discharged into a bucket elevator and elevated and discharged to a Robins "Cataract" grizzly. All the material passing through the grizzly falls upon a belt conveyor and is taken over to the top of the raw mill bins.

***Bucket elevator lifting rock from the hammer mill to the rock storage***

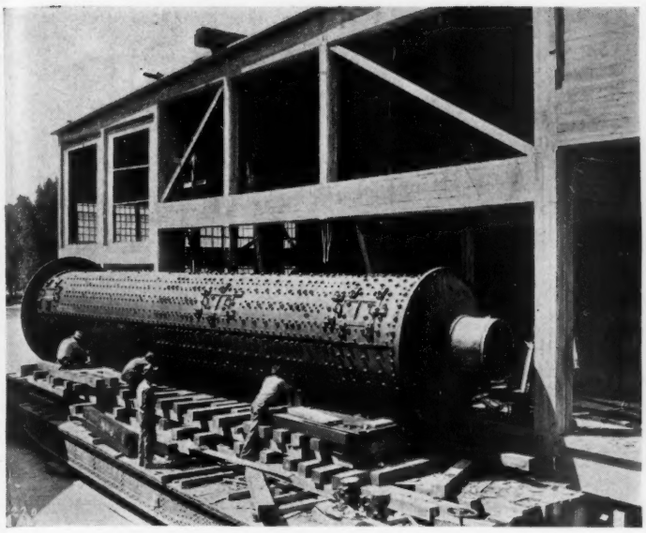
The material passing over the grizzly goes down a chute into a No. 37 Kennedy-Van Saun gearless gyratory crusher. The discharge from this crusher falls on the same elevator it has just left and again goes to the Robins grizzly and to the belt conveyor to the mill. By means of a tripper the material is discharged from this belt conveyor through holes in the roof into the feed storage bins over the receiving end of the raw grinding mills.

### *Raw Grinding Mills*

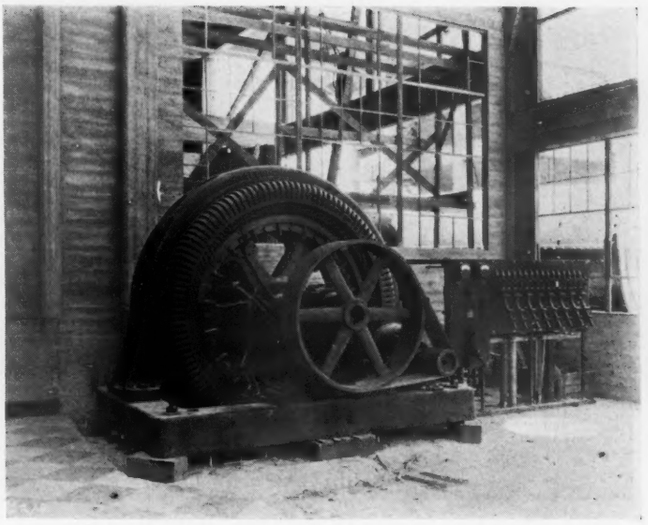
The plant is a wet process plant, with five combination ball and tube mills. These mills, beginning at the middle of the building, are numbered 1, 2, 3, 4, and 5. No.'s 1, 2, 3, and 4 are practically identical and were manufactured by the Allis-Chalmers company. They are 7-ft. inside diameter and 26 ft. long, compeb mills, lined with steel and having 65,000 lb. of balls in each. The rock from the feed storage bins is fed into the preliminary end of these mills by a rocker feeder. With the rock there is fed 37%, by weight, of water. Mill No. 1 was installed in 1916, No. 2 in 1920, No. 3 in 1921, and No. 4 in 1923. No. 5 mill was put in operation in 1926 and was manufactured by the Traylor Engineering and Manufacturing Co. It is much larger than the others and has a number of special features. It is 7-ft. inside diameter and 40 ft. long. The rock is fed into this mill by a double inclined table




***General plan of the Victorville, Calif., plant of the Southwestern Portland Cement Co., which has been expanded from an operation with a single kiln, one raw mill and one finish mill in 1916 to the 5-kiln operation illustrated above. The buildings are all reinforced-concrete structures and of course no changes have been made in their essential features or grouping. The original No. 1 kiln is the one next the clinker storage—the most westerly. The four kilns on the other side of the stack have been added one at a time during the past 12 years, with corresponding expansion of the mill building and slurry storage. The compactness and ease with which these changes were made shows the result of the careful planning of the original mill***



*Raw Mill No. 5 during erection. No. 4 mill can be seen in the rear*



*Supersynchronous motor for driving Raw Mill No. 5, taken during erection*

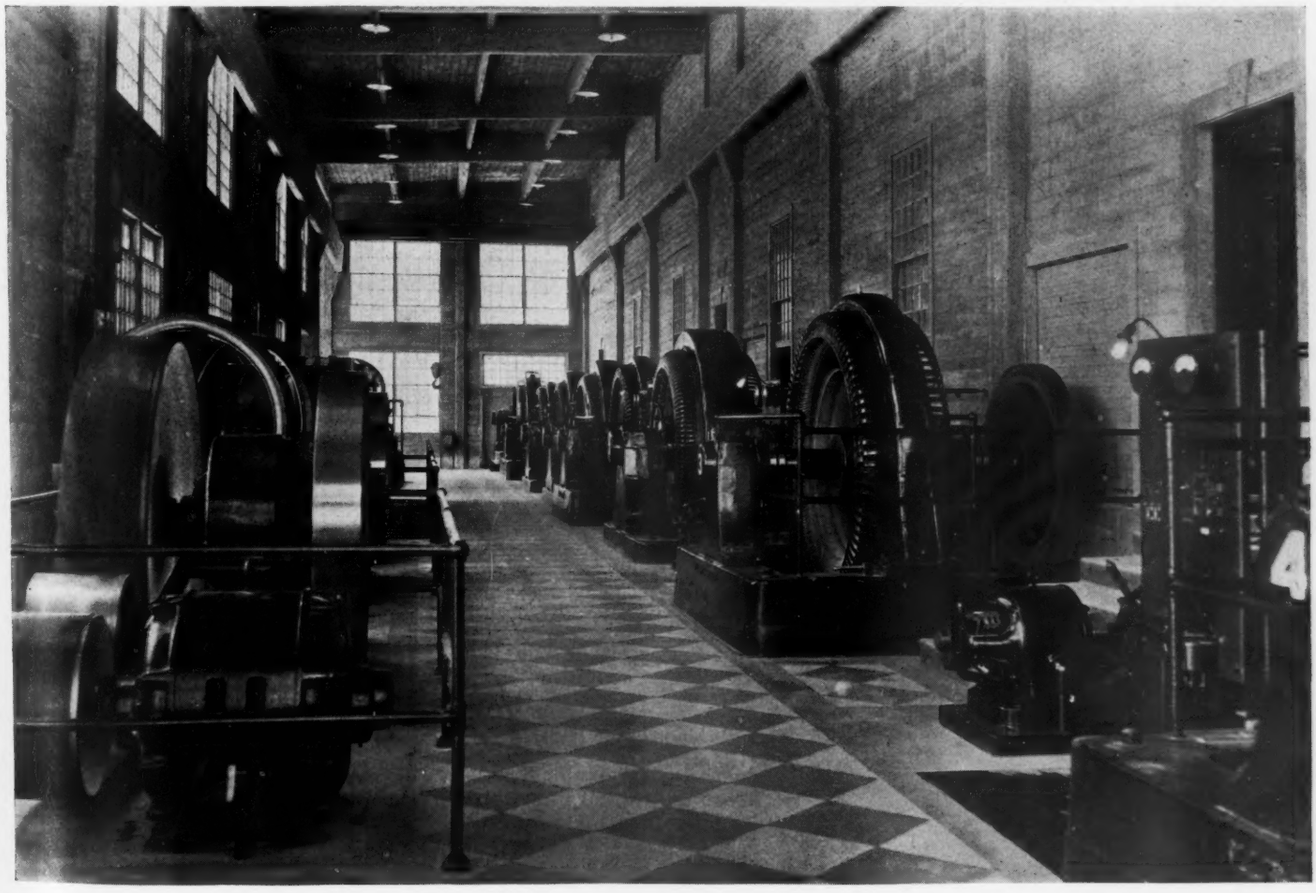
feeder, which gives a more uniform feed than the rocker feeder.

The slurry from all the mills empties into a common trough and is passed over a Tyler "Hum-mer" screen to take out all possible lumps or coarse particles. When it leaves the milling room it must be fine enough so that 90% to 95% will pass through 200-mesh, and 99% will pass through 100-mesh.

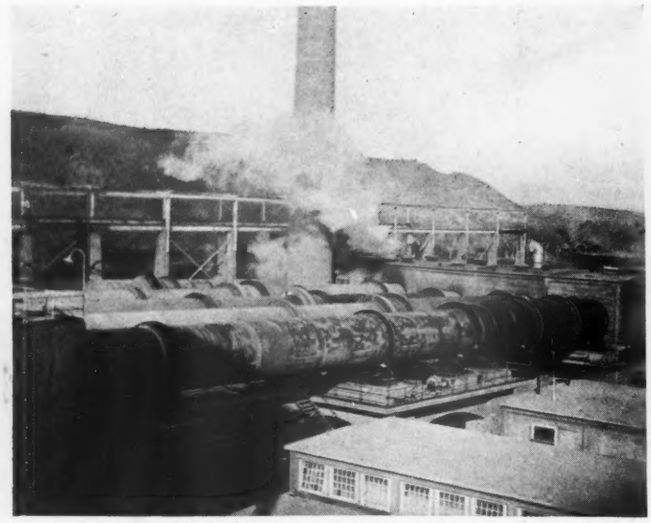
### *Slurry Storage*

The slurry from all the mills finally runs to a sump and is pumped by Wilfley slurry pumps to cylindrical storage tanks adjoining the mill building. Up to this point of operation the percentage of lime, clay and silica in the slurry has been proportioned in accordance with the best judgment of those who have received and stored the rock and the chemist who directed the withdrawal of the rock from the storage pile. The slurry is agitated by compressed air.

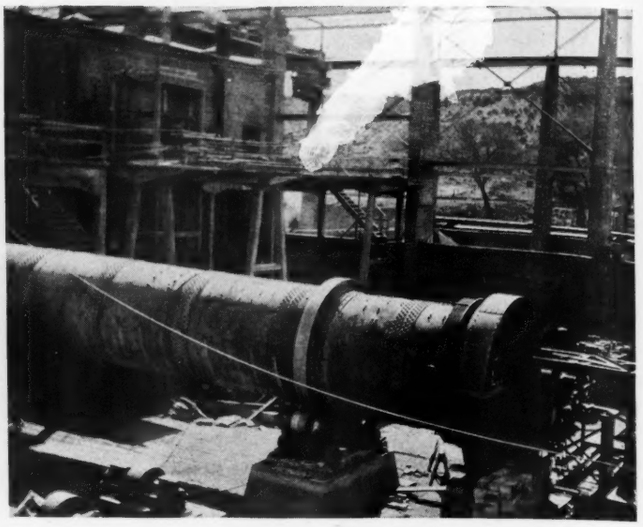
There are sixteen slurry tanks each holding 750 bbl. The tanks are divided into three



*Eight of the ten motors which operate the mills. On the left are the air compressors and overhead is a traveling crane for erecting and dismantling the equipment*

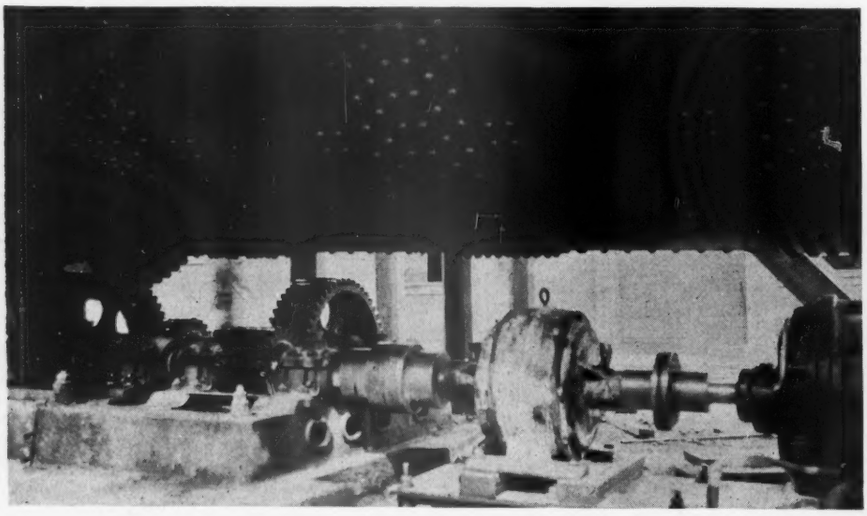


*View of the kilns from the crusher building, showing the enlarged section of Kiln No. 5*

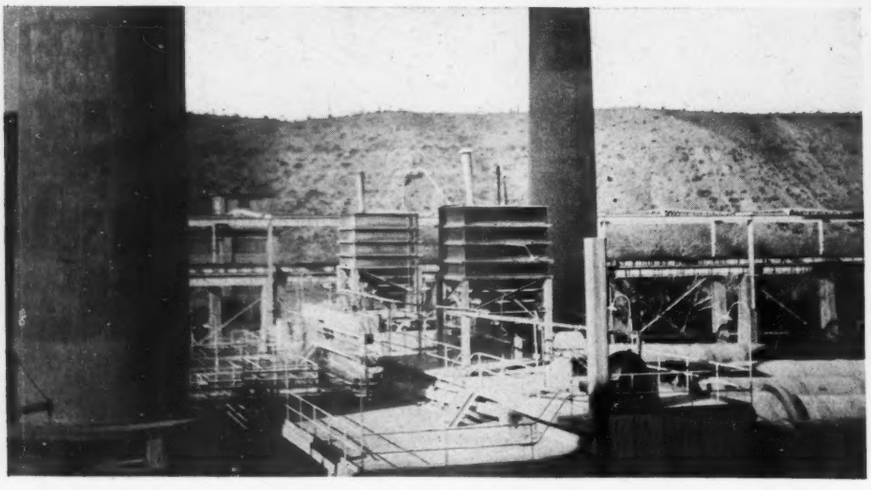


*Rotary cooler during construction with the foundation for the second cooler showing in front*

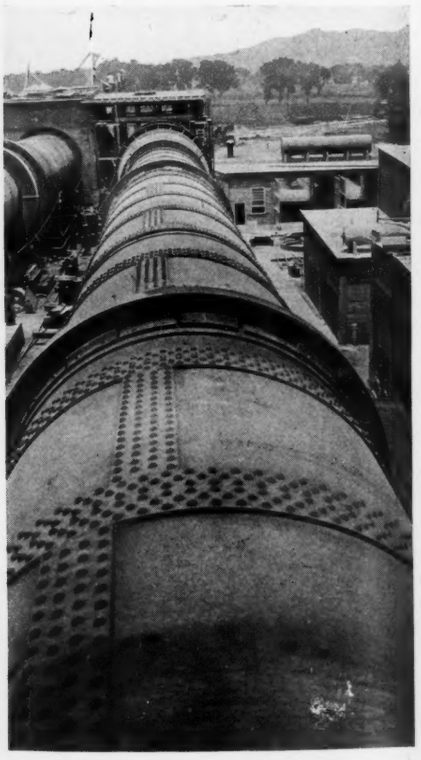
classes, mill tanks for storing the slurry as it comes from the mill, mixing tanks for mixing the different grades of slurry, and kiln-feed storage tanks. A chemical analysis is made of the slurry in the mill tanks after it has been thoroughly agitated. Some of these run slightly too high in lime and some slightly too low. When the analysis has been made, the different grades of material are pumped into the mixing tanks until this slurry is of the proper proportion for feeding to the kilns. After this has been properly mixed and checked it is pumped into the feed tanks and fed to the kilns.



*The electric motor and reduction gear for driving kiln*



*The dust hoppers where dust collected from the kilns is returned to the slurry and back to the kilns*



*Looking along No. 5 kiln, with No. 4 kiln showing to the left*

### *Clinker Burning*

From the kiln-feed tanks the slurry is pumped into a long concrete trough from which it runs to smaller troughs for each

kiln. It is taken from these troughs by S-type feeders and fed into the rotary kilns. The S-type feeders are driven by variable speed motors under the control of the kiln operator at the burning end of the kiln. If at any time the heat of the kiln diminishes or the speed of rotation slackens, the feeder is slowed down correspondingly, and vice versa. The company is replacing the S-type feeders with the Ferris wheel type of its own make, which has proved more constant and dependable.

There are five rotary kilns, Nos. 1, 2, 3, 4, and 5, No. 1 being next to the clinker storage. The first is of Allis-Chalmers make and is 9 ft. inside diameter and 200 ft. long and was installed in 1916. Kilns Nos. 1, 2, 3, and 4 are Vulcan kilns and are 10 ft. 6 in. by 9 ft. inside diameter and 200 ft. long. No. 2 was installed in 1920, No. 3 in 1921, and No. 4 in 1923. Kiln No. 5 was furnished by the Traylor Engineering and Manufacturing Co. and installed in 1926. No. 5 is 10 ft. inside diameter and 200 ft. long, with an enlarged burning zone, 13 ft. inside diameter and 30 ft. long. All kilns are lined with a 9-in. lining of refractory brick. All kilns have four sets of carrying rolls and tires and are each driven by a 50-hp. motor, through a Foote Bros. reduction gear.

The kilns are fired with oil. The temperature of the kiln at the firing end is about 2700 deg. F. The oil is passed through a pipe coil, located just inside the kiln firing door, and heated to a high temperature before being fired.

### *Dust Collection From Kilns*

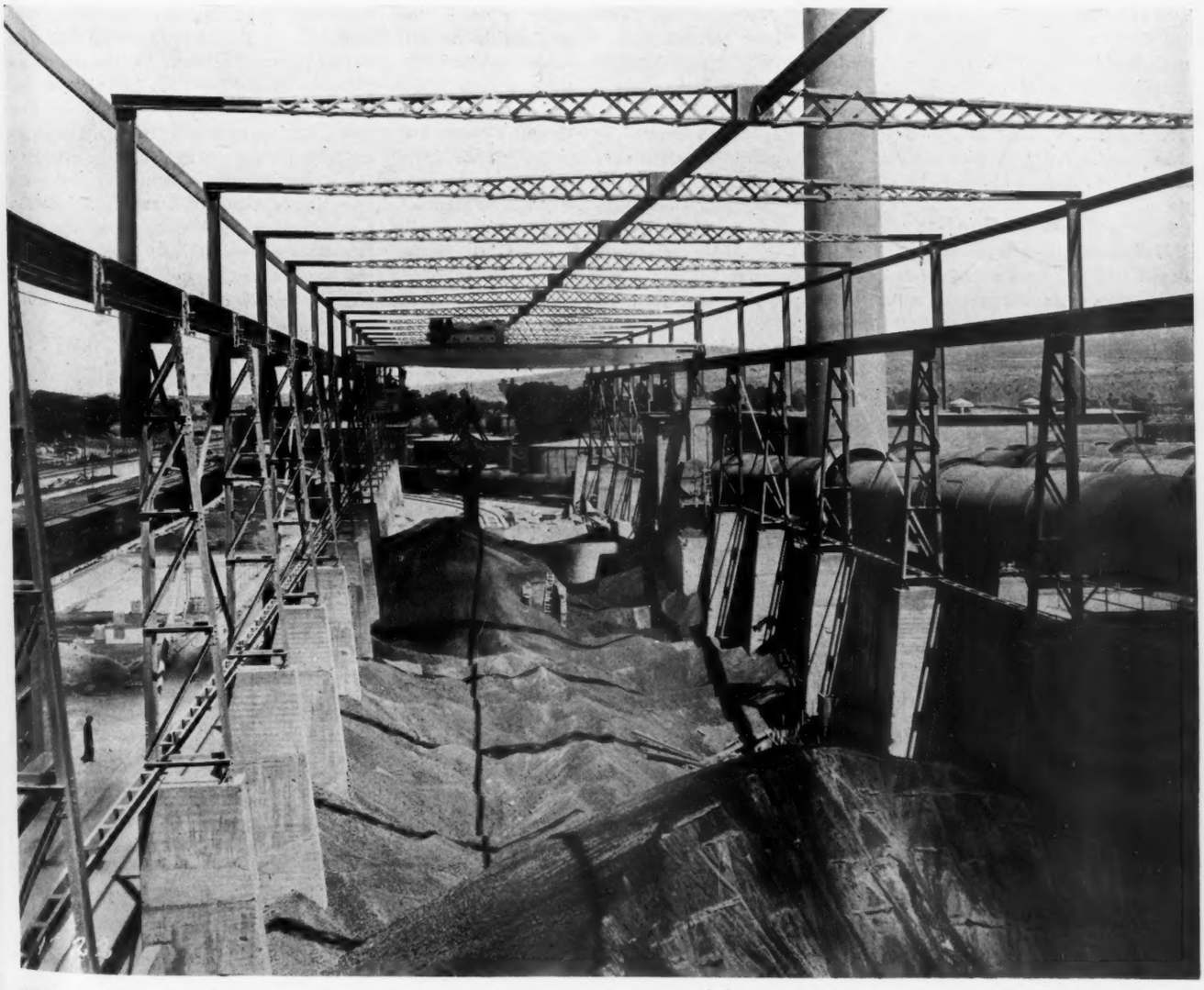
Excessive dust from the kilns is prevented from going out the chimney by operation of large dust chambers in series with the kilns. The dust thus collected is conveyed to a small Fuller-Kinyon pump and pumped up into large dust hoppers over the kilns from which it is later fed into the kilns with the slurry feed.

### *Cooling and Storage of Clinker*

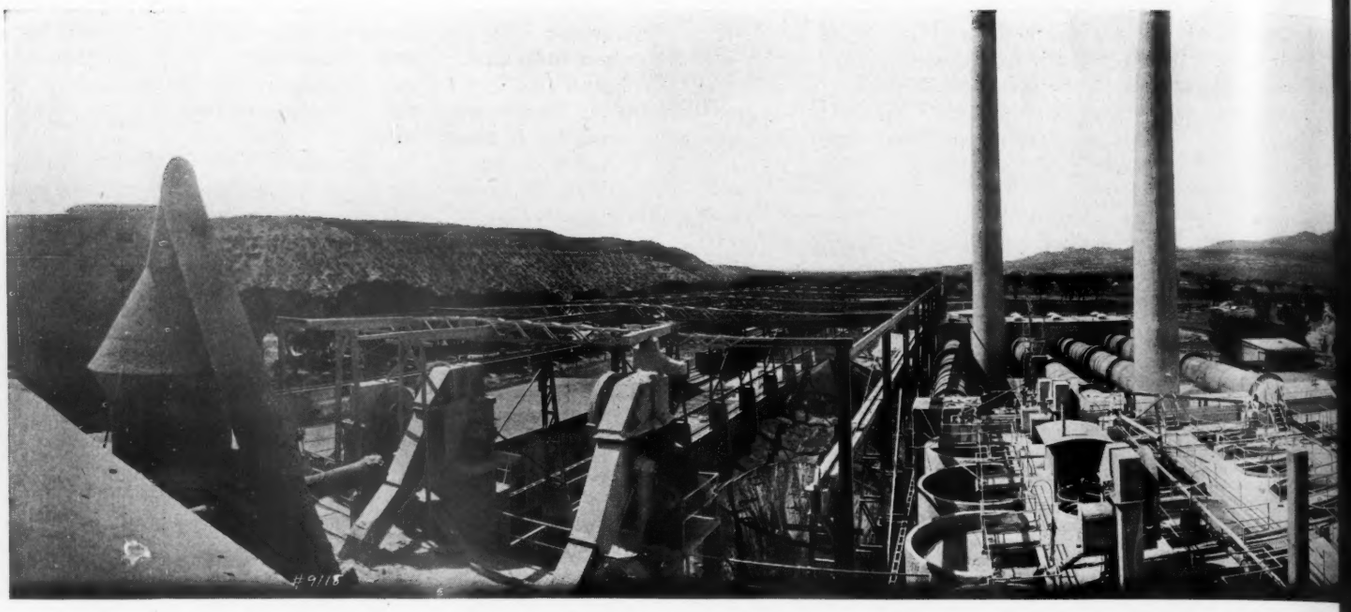
The clinker falls from the ends of the kilns through a vertical cooler and then upon a grizzly. That which passes through the grizzly falls into a trench that extends past all the kilns and into which all five kilns discharge. The clinker is conveyed by a drag chain along this trench and discharged into a bucket elevator, which carries it up and discharges it over into the clinker storage.

This method of cooling clinker is to be superseded by the installation of rotary coolers. One of these coolers was in place and the second was about to be erected when these notes were written. Three more will soon be added and then the drag chain system will be discontinued except as emergency equipment. The rotary coolers are 8 ft. inside diameter and 90 ft. long, lined with refractory brick. The clinker is fed into the coolers as it is discharged from the kilns and falls out at the low end cool enough to be taken into storage. A reciprocating pan conveyor will take the clinker to a bucket elevator which will deliver it into the clinker storage.

The clinker storage is about 55 ft. wide by 420 ft. long and has a capacity of 100,000 bbl. It is equipped with a 15-ton overhead Pauling and Harnischfeger electrically oper-



*Clinker storage bin, with overhead traveling crane, beside the kilns (right) and with the oil storage tanks in the background*



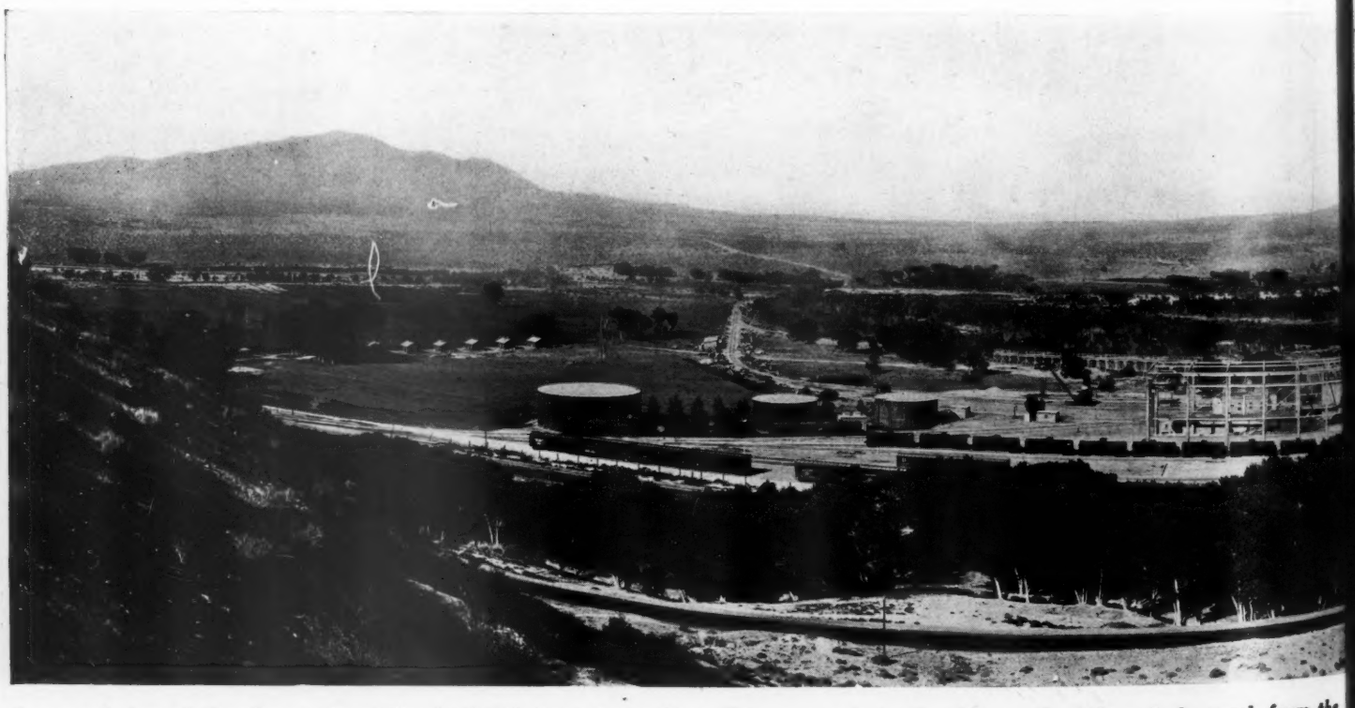
*A close-up of the entire plant showing the clinker storage bin, the slurry storage tanks and the kilns in the left half of the picture, of rock cars and the cable car pusher for*

ated traveling crane, which travels the entire length of the bin. The crane operates a 4-yd. grab bucket, which takes the clinker from the discharge point of the bucket elevator and distributes it throughout the storage bin. The gypsum, which comes to the plant by train, is also unloaded with the grab bucket and put into storage at one end of the bin.

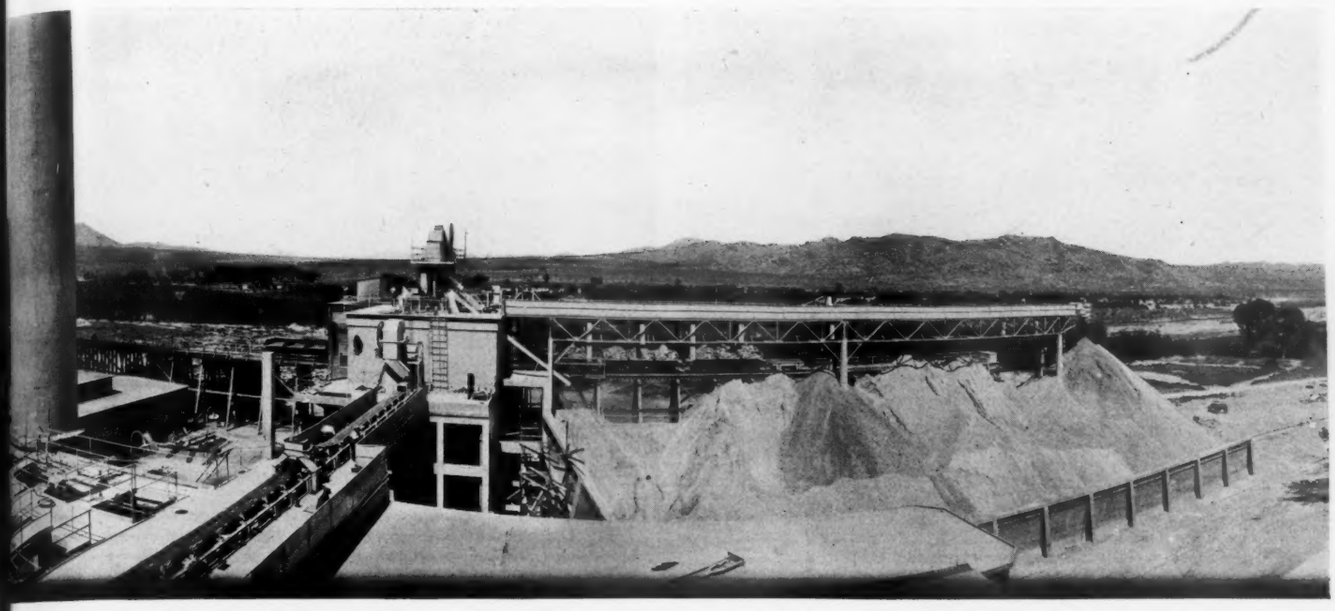
### *Clinker Grinding*

Underneath the clinker storage bins is a tunnel equipped with a 24-in. belt conveyor, which runs over a magnetic pulley at the discharge end. The clinker after passing over this magnetic pulley, which extracts from it any tramp iron which might injure the crusher rolls, goes through rolls which break it down to a size of ¼ in. to ½ in. It is then elevated by a bucket elevator and goes through rotary scales, where it is weighed. These rotary scales operate a gypsum feed which adds the proper amount of gypsum. The clinker is then ready to go to the finish grinding mill, now having the proper ingredients of cement.

From the scales the clinker is conveyed to storage feed bins over the finish mills. These are Allis-Chalmers compeb mills similar to the raw mills and located similarly in the same room. There are five of these mills numbered 1 to 5. No. 1 raw mill and No. 1 finished mill are side by side and both sets of mills number away from the middle of the room. When the plant was first put in operation in 1916, No. 1 raw mill and No. 1 finished mill were all there were. The others have been added in the same sequence as the raw mills. Nos. 1 and 2 are 7 ft. inside diameter and 20 ft. long; Nos. 3 and 4, 7 ft.



*A general view of the plant in its setting in the Mojave river valley. The quarry is in the hills at the left and the track from the are the new silos*



*while the trestle with the track from the quarry, the rock storage and rock conveyor to the mills are shown in the right half. A train spotting the cars is shown on the trestle*

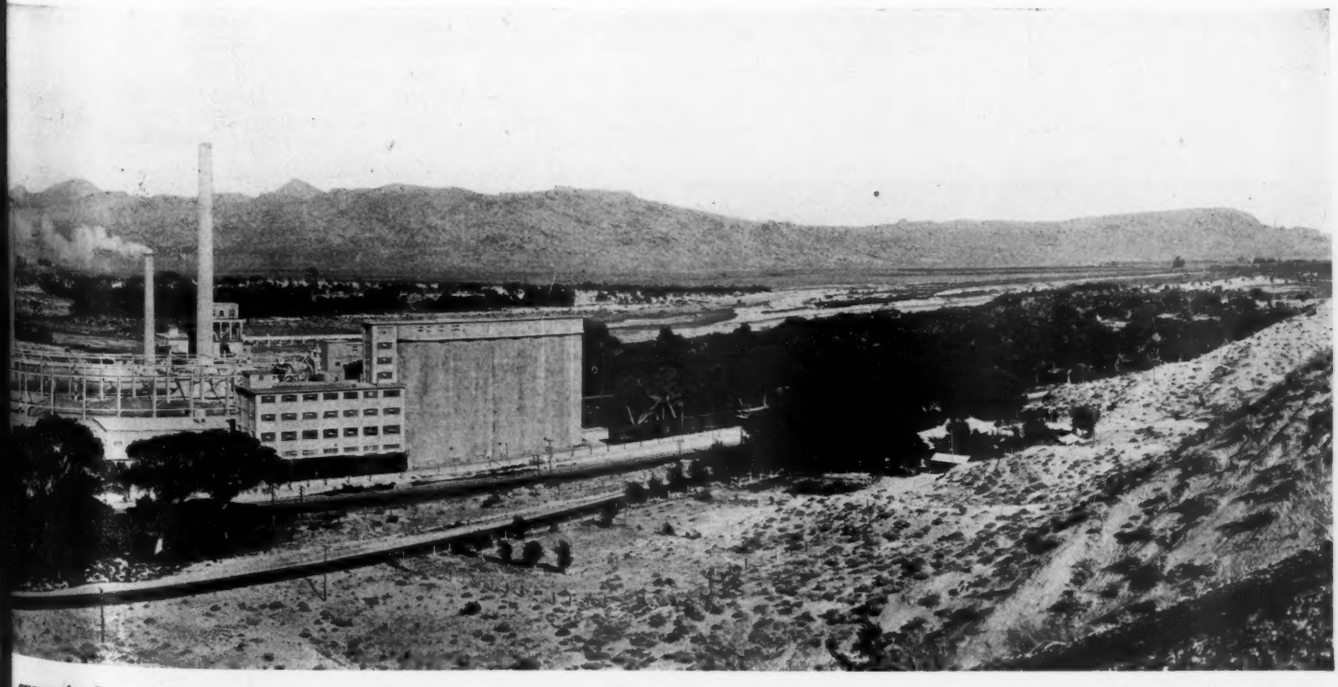
by 26 ft.; and No. 5, 7 ft. by 40 ft. The operation is almost identical with that of the raw mills.

The discharge from mills Nos. 1, 2, 3 and 4 is taken by bucket elevators to the third floor of the building and put through air separators, where any coarse particles are taken out and returned to the mills for regrinding, practically making a closed circuit. The cement as it leaves the air separators must be of such fineness that approximately 85% will pass 200-mesh. From the air separators the cement is discharged to a belt conveyor which carries it up to the top of the silo storage bins adjacent to the packhouse.

The cement from No. 5 mill does not discharge into a bucket elevator but goes into a drum at the end of the mill, from which it is conveyed by air directly to the silos. This mill being much longer than the others, it is not necessary to put its output through an air separator. Work is now in progress to put pumps on all finish mills and do away with the bucket elevators except as a standby. However, the cement from mills No.'s 1, 2, 3, and 4 will still continue to go through the air separators.

The power plant is located in the grinding mill building and is partitioned off from the mill by a concrete wall. The power is entirely electrical and is purchased from the Southern Sierras Power Co. Each mill is directly connected to an electric motor. These motors are of Allis-Chalmers make, slow speed, 176 r.p.m., and are numbered the same as the mills. On the older mills the sizes of motors range from 300 hp. to 500 hp. Four of these are synchronous motors with Cutler-Hammer magnetic clutches and four are induction motors.

No. 5 raw mill motor is an Allis-Chalmers 900-hp. supersynchronous Hytork motor, so



*quarry is shown. To the left are also the oil storage tanks. The plant with its five kilns is shown in the center and a little to its right and packing house*

*Underneath the storage silos, showing the discharge gates and the screw conveyor for carrying cement to the packing plant*

*At the top of the storage silos, showing the discharge from the cement belt conveyor to the screw conveyor for distribution of cement to the different silos*

arranged that it can be started as an induction motor on full load and will automatically pull into synchronism when it gets up to speed. This motor is connected direct to the mill. No. 5 finished mill motor is almost identical with this, except that it is rated at 750 hp. The reduction is such that the mills turn at a speed of about 22 r.p.m.

There are three Ingersoll-Rand air compressors in the power plant. One of these, of a capacity of 880 cu. ft. per minute, has recently been added to provide additional compressed air.

### *Cement Storage*

The company has a battery of four old silos built in 1916 with a storage capacity of 40,000 bbl., and a battery of four new silos, just completed within the last year, with a storage capacity of 120,000 bbl. Cement from the top floor of the grinding mill is conveyed up to the top of the old silos and, if to be stored there, is dropped into screw conveyors and distributed each way from the belt. If it is to be stored in the new silos it continues up on another belt conveyor to the top of the new silos and is there taken by screw conveyors and distributed either way to the end of the storage. There are sliding gates under these screw conveyors that will permit the distribution of the cement to any desired silo or to the interstices. The four old silos are now used for special cements, such as "oil-well" cement and "hydroplastic" cement.

Beneath the new silos there are three lines of screw conveyors resting on the floor and extending from the extreme south end of the storage bins through into the packing house joining the storage bins on the north. Underneath the storage bins are feeders about 7 ft. above the floor, which feed the cement into the screw conveyors.

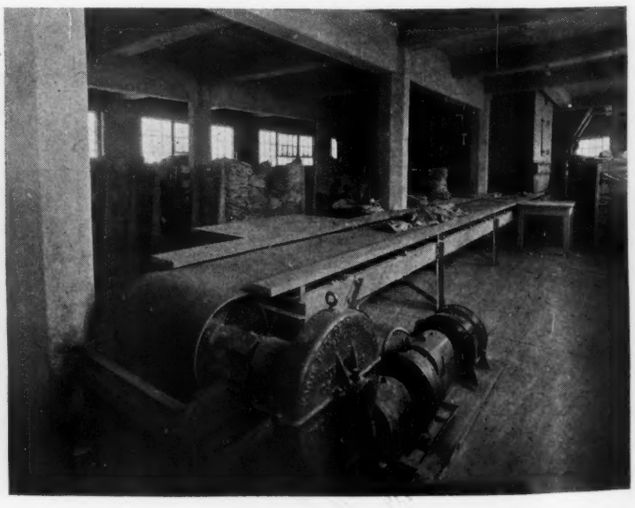
The cement is discharged from the screw conveyors into bucket elevators and elevated to the top of the four-story packing house. It is there taken through rotary screens which remove any foreign matter and render it ready for packing and shipping.

### *Packing and Shipping*

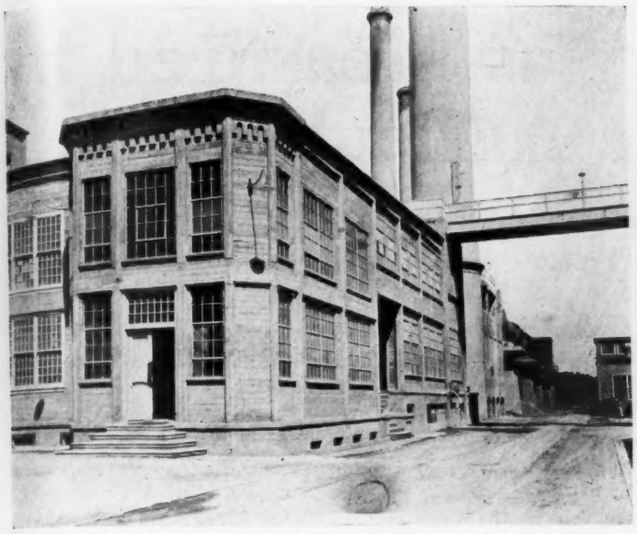
There is an underground tunnel in which is a cross conveyor connecting the two batteries of silos so that cement can be conveyed from storage in either set of silos to the packing house of the other if desired. There are six 3-spout Bates packing machines, four in the new packing house and two in the old. The filled bags are conveyed to the loading platform, where they are loaded into cars. There are two tracks between the two packing houses.

Used bags are received in bales and are taken up the elevator at the north end of the packing house, to the fourth floor, where they are sorted over and made ready for use. The foreign bags that have inadvertently been included are made up into bales and sent to their proper owners. The bags that need mending are piled in one pile for repairs. Those that are so badly torn that they cannot be used again are cut up for patches.

*The chemical laboratory at the Southwestern plant, adjoining the office of the chief chemist*



*Bag sorting room with the conveyor for carrying bags to the cleaner, which is on the floor below*



*This view of the mill building furnishes a good idea of the permanent character of the plant buildings. Kiln No. 5 is in the rear*

*The attractive office building at the Southwestern plant, containing the office of the superintendent, right, and of the chief chemist, left*

Those that are in good shape are piled by themselves. A number of large sewing machines are kept busy mending and patching.

The bags are put through a Bethlehem Foundry Co. bag cleaner and thoroughly cleaned. This cleaner is connected to an exhaust fan which carries off the cement dust and returns it to the bins. Dust collectors are much in evidence.

### *Machine Shop and Storage Room*

The company maintains a large machine and repair shop fully equipped with modern electrically-driven machine shop tools. Here they do all ordinary repairs and build much of the auxiliary equipment. In the same building is another room in which is a blacksmith shop and plate and structural shop equipped with a power hammer, punches, shears and benders.

In a building next to the machine shop is located the storeroom. This storeroom is exceptionally well arranged and well kept. In addition to the inside storage there is maintained an outdoor storage for rough repair parts. Duplicate parts are kept of all equipment that is at all likely to need replacing. The outside storage is in a locked enclosure and is under the care of the storekeeper. No piece of apparatus can be taken out without a properly signed order.

In a portion of the same building with the storeroom are the first-aid rooms. These are well equipped and are under the care of the "first-aid squad." Adjoining the first-aid rooms, in the same building, are locker rooms, shower baths and toilets.

### *Laboratory Department*

The chemical laboratory occupies one side of the office building and is thoroughly well equipped and modern. In the basement beneath the laboratory is located the testing department, with facilities for all standard tests. To the testing equipment there has just been added a Reihle Bros. 200,000-lb. testing machine for compression tests of concrete.

The laboratory department is under the chief chemist and a staff of assistants. This department operates in three 8-hour shifts, as there must be one or more chemists on duty at all times when the mill is operating.

### *Office and Laboratory*

The office building, nestled in among the spreading cottonwood trees, is a neat and attractive one-story building. A broad hall runs the entire length of the building. On one side of the hall is the office of the plant superintendent. Back of his office are conference rooms and the engineer's office and drafting room. Across the hall is the office of the chief chemist, and the chemical laboratory occupies most of the remaining floor.

### *Miscellaneous Facilities*

A safety-first committee is maintained among the employes and safety-first contests are held among the departments. A monthly record of accidents is posted on a bulletin board in a conspicuous place in the yard.

The company carries group life insurance for its employes, besides the regular employes' liability insurance. There is also being arranged a benefit insurance among the employes which by paying a certain amount each month will give them a weekly benefit allowance in case of sickness or accident.

Electric power for operating the plant is obtained from the power line of the Southern Sierras Power Co., at 33,000 v., and transformed down to 440 v. in an outdoor substation.

Oil for fuel is received in tank cars and stored in three tanks holding a supply of 2,500,000 gal. The plant uses about 65,000 gal. of oil per day. There is also a fireproof storage room for the storage of lubricating oil and gasoline for various purposes.

### *Organization and Personnel*

The Southwestern Portland Cement Co. is an organization with three widely distributed plants, one at El Paso, Tex., with a capacity of 3500 bbl. per day; another in Osborn, Ohio, with a capacity of 5500 bbl. per day, and the Victorville plant, with a capacity of 6000 bbl., making a total of 15,000 bbl. per day. These plants have been designed and constructed under the company's own organization. Practically all the construction work of the company is done by its own force.

It was through the dynamic power and tremendous "super-energy" of the late Carl Leonardt that the Southwestern Portland Cement Co. came into being and owes much of its present state of success. The company is considered as the possessor of some of the most efficient and best equipped plants on the North American continent. Not only was it years ahead of its time in the design of each of its plants, but it is also in some measure responsible for the introduction of super-quality, or so-called high early strength cements.

After the death of Mr. Leonardt, his son-in-law, Frank H. Powell, was made president of the company. The other officers of the company are C. C. Merrill, first vice-president and general manager; C. A. Fellows, second vice-president; M. A. Koffman, secretary; James G. McNary, treasurer; F. R. Partridge, general sales manager; and W. C. Rieth, chief engineer.

The supervision of the plant and its operation is under L. V. Robinson, superintendent, while the responsibility for the quality of the products rests with R. W. Willson, chief chemist. The offices of Mr. Robinson and Mr. Willson are at the plant. The general offices of the company are at 356 South Spring street, Los Angeles, Calif.

# Results of Publicity as Measured by Lime Sales for Agriculture

## A Comprehensive Summary of What Agencies Outside the Lime Industry Have Done to Promote the Use of Lime

By Dr. H. J. Wheeler

Manager, Agricultural Serivce Bureau, the American Agricultural Chemical Co., New York City

THE EARLY USE of lime in agriculture in the United States appears to have been due to trials of it by settlers from Europe who were familiar with its practical employment in their home countries. Perhaps the most notable of the early efforts to encourage the use of lime, in the form of marl, were those of Ruffin in Virginia, to be found in his "Essay on Calcareous Manures," the fifth edition of which was published in 1853. The first use of marl in Virginia was near Jamestown where marls from the beds of that section were utilized.

The use of lime in New Jersey mentioned by Dr. George H. Cook in "The Geology of New Jersey," published in 1868, and frequently referred to in his reports of the State Board of Agriculture, covered the period from 1873 to 1880.

Dr. Williams of the North Carolina Station says that lime has been used in that state for at least 100 years, and some 40 to 50 years ago most of the farmers in the Coastal Plain section used marl from the local beds.

In Georgia lime was used to some extent at least 15 to 20 years prior to the Civil War.

According to William Logan, lime was used in Pennsylvania as early as 1754; and writing in 1756 he says, "Mountjoy is a manor that belonged to a daughter of Mr. Penn, and here the first limestone was dug that ever was found in America."

The common use of lime in England was attested by Hartlib as early as 1651; and in 1637 a Massachusetts settler writing to England said, "I do believe, that if we had marl, lime, or other manure, this barrenness might, in part, be cured, but, as yet, we are destitute of these supplies."

Frear in Bulletin 261, published in 1915 by the Pennsylvania Department of Agriculture, entitled "Sour Soils and Lime," says "calcareous dressings" have been used since the time of Hesiod, 1100 B. C., if not earlier.

### *Disuse and Abuse of Lime*

From the history of lime and its use it is evident that in many countries its employment was followed by disuse perhaps because of its abuse—only to be again taken up at a later date. Frear says, "In the latter half of the last century development of the industry in nitrogenous, phosphatic, and potassic fertilizers led to the almost total abandonment of liming, save in a few localities where there were special reasons for the practice, or where the farmers were most conservative." He mentions the fact that its earlier use was for the purpose of improving the texture of soils, liberation of plant foods existing therein, or added to the soil in manure or green manures, whereas he states that today the principal consideration covering the practice of liming is the correction of soil acidity.

In a booklet on lime, issued by the Board of Agriculture of Scotland, the author "laments the fact that liming in Scotland went out of fashion 40 or 50 years ago and that by 1900 the practice had almost become extinct." The author states that in Scotland the soil is suffering more from a lack of lime than from any other manurial ingredient, and the more highly the land is farmed, the more necessary lime becomes.

A recent hasty search of *Jahresbericht für Agrikulture-Chemie* (Germany) for the years 1890 to 1900 shows not a mention of soil acidity, although the use of lime is occasionally referred to.

While lime had been used to some extent locally in this country as already mentioned, the condition between 1880 and 1900 in the country generally, was much like that of Scotland, and probably much less lime was being used in the early 90's than at certain earlier periods.

A good idea of how little had been done before 1900 by the agricultural experiment stations and by the United States Department of Agriculture with lime can be gained by consulting the *Experiment Station Record,* since it gives abstracts of all work done by the agricultural experiment stations and the United States Department of Agriculture, beginning with the year 1889.

The first report mentions air-slaked lime having been used in Alabama in an experiment with peas, in which lime gave a better return than complete fertilizer. Another trial of lime is also reported covering the years 1886-88 inclusive. These were with cotton and the results were inconclusive. The next reference is in the year 1890-91; however, this is the work done in Japan to determine the effect of lime upon rice, and its effect in preserving the assimilability of phosphoric acid.

The third volume, 1891-92, had no reference to the use of lime.

The fourth volume, 1892-93, has a reference to English work showing that lime increased the penetrability of the soil for water. Also in the same volume there is a reference to the use of lime in Holland for improving the physical condition of stiff, impervious clays.

The next reference, in Vol. 5, 1893-94, is to trials of lime in North and South Wales,

### *Editor's Note*

***THE AUTHOR of this article is probably better known to the lime industry as an agricultural expert than any other man, or at least he should be; for in the early days of the National Lime Manufacturers' Association he was on the program many times. The reader of this article will see that Dr. Wheeler has never lost his interest in the agricultural use of lime and limestone.***

***This article is the most comprehensive summary of the literature of the subject we have ever seen; and we are sure it should find a place in the reference file of every producer of lime and limestone.***

***If we read Dr. Wheeler's thought rightly, he has done his best to impress lime manufacturers with the value of publicity, and more publicity, in connection with the growth in the use, or consumption, of lime and limestone in agriculture.***

***In spite of the 25 or 30 years since this publicity was started only a beginning has been made in the possibilities of developing this branch of the lime industry. But the lime industry cannot rest secure and review this work with complacency. The publicity of 20 or 10 or 5 years ago is not going to find markets for a very large tonnage of lime or limestone today. Instead, a really live, progressive industry would be stimulating publicity today to prepare for a larger demand 20 years from now.—The Editor.***

also to its beneficial effect on oats at the Rhode Island Agricultural Experiment Station, and to its successful use with corn at the Maryland Station.

The next reference, Vol. 6, 1894-95, is to trials in Germany, but as usual there was no mention of soil acidity. The same is true of a reference in the same year, to trials in France where lime increased the yield of fodder beets fourfold to sixfold.

If the writer is not mistaken, the only reference in the early editions of Storer's "Agriculture" to acid soils was in connection with bogs, morasses, and places of similar character. However, in the edition published in 1916, he devoted a page and a half to the subject "Lime Corrects Acidity," in which the Rhode Island experiments are mentioned.

### *Early Practice Entirely Overlooked Soil Acidity*

What has been said shows that there is nothing new in the use of lime, and it is evident that during the last quarter of the preceding century experimenters in this country and in Europe went out of their way to explain by all sorts of means, results of experiments which would have been obvious at once had soil acidity been recognized as an influencing factor.

The writer in the "Report of the Rhode Island Station" for the year 1890, published early in 1891, said, in discussing ill effects with sulphate of ammonia: "Whether delayed nitrification was due to the absence of nitric ferment or to the possible acidity of the soil and a lack of carbonate of lime, we are unable to say."

The chemical reaction of the soil was, however, promptly tested and the existence of a high degree of soil acidity was noted. On July 27, 1891, the first application of lime was made, but too late to give positive results that season, though some signs of improvement were noticed before growth ceased.

The "Fifth Annual Report," for the year 1892, records the fact that the lime overcame the difficulty connected with the use of sulphate of ammonia.

The first extended paper, covering the occasional ill effects of sulphate of ammonia as a manure and the use of lime in overcoming it, was published in the "Report" for the year 1893, issued early in 1894. The ill effects with sulphate of ammonia when used on an acid soil were not noticed until the second year of its application at Hope Valley, R. I., and in the third year of its application at Abbott Run, R. I. In 1893 experiments were begun at the Rhode Island Station with about thirty different kinds of plants, which for the first time called most striking attention to the fact that some plants could thrive on acid soils where others failed completely, and that on the other hand, while certain plants were benefited by lime, it was positively injurious to others.

During this time many samples of soil were secured from different states, and the existence of soil acidity in upland, well-drained soils was generally established. Also the soils were tested and experiments conducted with beets and clover in many parts of the state, which showed that the condition at Kingston was by no means unusual, although more extreme than in most places except Slocums, R. I.; yet at Hope Valley and Abbott Run they were nearly as bad.

The first extended publicity given to this work was by H. W. Collingwood, editor of the *Rural New-Yorker,* who published in that paper, in 1893 or 1894, for several successive weeks long articles relating to the Rhode Island experiments. However, the results were not generally accepted as of any particular value or significance, even by other experiment stations for nearly 10 years after the work was begun.

In February, 1900, Bulletin 62 of the Rhode Island Experiment Station, entitled "Chemical Methods of Ascertaining the Lime Requirements of Soils," was published and soon thereafter Vietch devised a method for this purpose which was soon rather generally applied, although it usually showed a higher lime requirement than was actually necessary. This was followed by the method of Hopkins, of Illinois, by that of Jones, of Vermont, and in more recent years by the electrometric and various other methods of determining the *p*H value of soils. Thus the general application of tests for soil acidity has been a great factor in giving publicity to the need for lime. In the meantime experiments with nearly 200 different crops were conducted at the Rhode Island Station, showing the relative need of lime for different crops.

### *Effects of Publicity Regarding Soil Acidity*

Let us now consider the result of the recent widespread publicity relating to the acidity of upland soils, and its effect upon the sale and use of lime.

Whoever attempts to ascertain how much lime has been used for agricultural purposes in the past is likely to meet with considerable difficulty. The only figures that I have been able to find for the year 1900 show that only 520 tons were used that year in the entire country, but this must be short of the actual amount, though possibly complete figures are nowhere available. The usual available data are published in reports of the United States Geological Survey, but 1906 was the first year where lime was reported by uses. The production of agricultural lime in that year was 300,204 tons and by 1909 it had reached 609,356 tons. In 1926 there were used in the United States the following kinds and amounts of lime given in short tons: Quick lime, 112,717; hydrated lime, 184,293; lime from oyster shells, 11,984; limestone (pulverized), 1,850,620; and calcareous marl 55,060.

In order to further check these figures, and ascertain with greater definiteness, if possible, the extent to which liming is practiced and the effect of publicity upon it in various states, a questionnaire was sent to practically all of the states where lime was likely to be used east of the Rock Mountains. It is interesting to note from these replies what has been done by way of stimulating the use of lime and what quantities have been employed in the various states. The questionnaire covered information as to the publications issued by experiment stations, extension departments, and departments of agriculture in each state.

The North Carolina Experiment Station has issued a bulletin on the use of lime on the farm, on soil acidity, and on lime for North Carolina soils. Also Information Circular No. 4. Two other bulletins are now in press relating to the value of lime on Cecil clay loam and on Norfolk sandy loam. It is reported that about 100,000 tons of ground limestone were used in North Carolina in 1927.

The Virginia Experiment Station has published in recent years two bulletins, Nos. 221 and 253, dealing with the subject of lime and its use. These have served as the basis for much publicity through the Extension Agronomy Service, all of which is believed to be largely responsible for the decided increase in the use of lime in recent years. A survey is now in progress for the purpose of ascertaining the increase since 1910, but these results are not yet available.

The New Jersey Experiment Station has published the following bulletins, circulars, and papers relating to lime: Station Bulletins 210, 267, 316; Circular 54; Extension Bulletin Vol. 1, No. 11; Circular No. 8; Extension Bulletins 31 and 430.

Seven articles on the use of lime have been published in *New Jersey Agriculture,* and five articles on the same subject in *Soil Science.*

In addition large numbers of soils in certain parts of the state have been tested as to the lime requirement.

According to a recent survey there are now being used annually in the state from 30,000 to 40,000 tons of lime in all forms. It was found impossible to get reliable statistics through the railroads because of no differentiation of the use to which the lime was put.

Mississippi reports that neither the Experiment Station, the Extension Service, nor the State Department of Agriculture has published any bulletins dealing directly with lime, except Technical Bulletin No. 7, in which there is a "lengthy discussion of lime and its agricultural uses," and no special advertising campaign has been conducted.

The lime used is very largely from limestone-crushing plants maintained and operated by the State Penitentiary. The highest output in any year since 1920 has been 2,693 tons, and the lowest 754 tons, from which it appears that the use of lime in Mississippi is practically negligible.

The Pennsylvania Experiment Station has

published Bulletins 149, 164, 131, and 211 on the subject of lime, and it is reported that about 400,000 tons of agricultural lime are used in the state annually. Its first use was by the early Dutch settlers, who came from New York approximately 100 years ago.

When special experimental work on the Volusia soil was begun, the farmers of Pennsylvania were using less than one-half as much lime as they are employing today.

The West Virginia Experiment Station has published five Bulletins, and one Extension Bulletin has been issued, which relate to the use of lime. The quantity of lime employed in the state was unknown.

The Delaware Experiment Station has issued one bulletin on the subject. One has also been issued by the Extension Department, namely, No. 11. The State Board of Agriculture has published some lime analyses from time to time. It is said the use of lime was already established in Delaware twenty years ago, and its early use may date back to Colonial days.

Some information in relation to the subject of lime is found in Bulletins 137 and 138. The quantity of lime in various forms used in that state in 1927 was about 14,000 tons.

From the Georgia Experiment Station it is reported that the State College has published three Bulletins on the use of lime, namely, Vol. 1, No. 5; Vol. 11, No. 271; and No. 24. No statement is made as to the amount of lime used in Georgia.

The Tennessee Experiment Station has issued Bulletins 86, 90, 92, 97, 102, 109, 119, 130, and 135 on the use of lime. In addition numerous articles on the subject have been published in *Soil Science* and elsewhere. No information was received as to the amount of lime used in the state.

It is reported from the Louisiana Experiment Station that there is but little available evidence that lime is needed in that state except where clovers are to be grown, and the clover crop is not important.

The Extension Service in Iowa has already printed 20,000 copies of a limestone bulletin, and 10,000 additional copies are soon to be printed and distributed. Many publicity articles have also been written and published in various papers. A special train was run through the state last year which reached 11,000 people in southern Iowa, and the use of limestone and the necessity for growing legume crops was especially stressed. In 1925, about 50,000 tons of limestone was used in that state. In 1926, the quantity rose to 150,000 tons, and in 1927 a total of 258,000 tons was applied to Iowa soils. About 75% of the soils of the state need liming before satisfactory stands of sweet clover, alfalfa, and red clover can be secured.

In Alabama, one Bulletin has been published by the Experiment Station on the subject of lime, while the Extension Service has published nothing. It is said that only a small amount of lime is used in that state.

In Kansas, the Experiment Station has published Bulletins 220, 226 and 242 on the subject of lime; and the Extension Department, Bulletins 32 and 45. From the best information available, it appears that the amount of lime used in 1921-23 was about 3,000 tons annually, and as a result of the publicity and campaign work carried on during those years the tonnage had increased to 18,000 tons in 1926, and to 35,000 tons in 1927.

The Texas Experiment Station has published Bulletin 243 on the need of lime in that state. Its use, however, is not at all common, and the quantity employed is probably negligible.

The Agricultural Experiment Station at Geneva, N. Y., has published seven bulletins on the use of lime. No further information was received from that source.

Minnesota has published Special Bulletin 107 and Research Bulletin No. 46. Lime was first used extensively in co-operative trials by the university in 1915, when 600 tons were applied on 150 fields. Marl occurs in Minnesota in hundreds of beds widely scattered over the central and northern portions of the state and is much used by the nearby farmers. One company which probably sells about four-fifths of all the limestone used in the state shipped last year 90,000 tons.

The Kentucky Experiment Station has published Bulletins 199, 228, and 272, and the Extension Department Circular 54, which has passed through four editions; also 59, which has passed through three editions; likewise 123, 163, 164 and 174. Much publicity has been secured through the agency of the agricultural press, by the County Agents through the use of posters, and by exhibits at the State Fair and the distribution of cards relating to liming.

The report of the lime campaign in Laurel County is to be found in the "Annual Extension Report" for 1926, on page 44. The amount of lime sold in Kentucky in 1923 was 60,000 tons; 1924, 75,000 tons; 1925, 91,000 tons; 1926, 102,000 tons; 1927, 132,000 tons, showing marked results from the publicity.

Florida has issued but one lime bulletin, No. 93, which is out of print. It is only now and then in the state that lime has been of particular use.

The Illinois Experiment Station reports only Circular 110 and Bulletin 212 as having been devoted specifically to the subject of the use of limestone. It is well known, however, that the late Dr. Hopkins was an ardent advocate of liming. It is said that the first carload of agricultural limestone used in Illinois was shipped in 1904, and by 1906 the quantity used amounted to about 122,000 tons. The following table shows the increase from 1906 to 1927:

| | | | |
|---|---|---|---|
| 1907 | 1,520 tons | 1913 | 72,000 tons |
| 1908 | 2,428 tons | 1914 | 82,000 tons |
| 1909 | 4,846 tons | 1915 | 94,000 tons |
| 1910 | 14,135 tons | 1916 | 113,000 tons |
| 1911 | 32,000 tons | 1917 | 132,000 tons |
| 1912 | 46,000 tons | 1918 | 200,000 tons |
| 1919 | 350,000 tons | 1924 | 525,000 tons |
| 1920 | 300,000 tons | 1925 | 795,000 tons |
| 1921 | 247,000 tons | 1926 | 707,000 tons |
| 1922 | 274,000 tons | 1927 | 718,000 tons |
| 1923 | 300,000 tons | | |

It will be noted that by 1910 the quantity had risen to 14,000 tons; in 1920 to 300,000 tons; and in 1927 to 718,000 tons.

A good check on the use of lime has been obtained through the Farm Bureau and from producers, and it is believed that this reported increase and wide extent of the use of lime is due to the publicity given the subject by the Experiment Station. The acreage of sweet clover, which is usually limed, increased from 70,000 acres in 1920 to 619,000 acres in 1927. It is believed that this increased acreage of sweet clover, which is widely used for pasture and soil-improvement purposes, is largely responsible for the increase in liming.

The Maryland Experiment Station has published six Bulletins on the subject of lime, and another is now in press. The first of these recounted some work done with lime on the experimental plots and appeared in 1898. A second report followed in 1900, which related to lime sources and its relation to agriculture. The latter is considered the first real lime publication. The exact tonnage of lime used in the state is not known, but is conservatively estimated at several hundred thousand tons annually. Hundreds of acidity tests of soil are made annually by the County Agents, and it is believed that the majority of the farmers of the state are now familiar with the necessity for lime and the benefits from its use.

The Missouri Experiment Station has issued three publications dealing solely with the use of lime on Missouri soils, and in 16 bulletins the use of lime has been stressed in conjunction with other soil treatments. These include both Station and Extension bulletins and circulars.

In 1920 only 10,000 tons of limestone were used in the state. By 1925 the amount had reached 102,000 tons; and in 1927, approximately 150,000 tons. There is probably no doubt that the rapid increase in the use of lime has been largely due to the activities of the Missouri College of Agriculture, principally through its extension service. About six years ago an extension specialist was employed whose primary duty was to increase the tonnage of limestone used in the state, and his activities are said to have had a "profound effect." During the last half-dozen years at least six other men have been giving much attention to this subject.

Indiana has published Experiment Station Bulletin 213, Circular 33, and Extension Bulletin 46. The use of lime in that state was begun about 1910, when experiments showed that it was an important limiting factor in the fertility of Indiana soils. Since then there has been a steady increase in liming, and its importance has been demonstrated on a number of important soil types throughout the state. About 90% of the lime used was in the form of ground limestone. It is now

used at the rate of about 200,000 tons annually. The publicity given to the subject is believed to be responsible for this great increase.

Director Morse of the Maine Experiment Station reports that matter relating to the use of lime was published in Bulletin 149, 164, and 167, although some of these relate to the effect of lime in promoting potato scab. I have been able neither to learn when lime was first used in that state, nor what quantities are used per year.

Massachusetts reports that prior to 1911 the use of lime as a soil amendment was not general in that state, although several kinds and grades were being offered. In that year the state fertilizer law was revised to include the examination of lime products, and Bulletin 137, in relation to lime and its use, was published. Some earlier work had been done with lime, reference to which may be found in the 14th Annual Report, page 39; 15th Annual Report, page 135; 12th Annual Report, page 14; Bulletin 11, page 8; Bulletin 161; and in Massachusetts Agriculture, Circular 20. Since 1911 a report on the lime products sold in the state has been made annually.

In the fall of 1924, it was ascertained that about 16,638 tons of liming materials were sold that year, of which 7,919 tons were of fine ground limestone. The figures do not include gypsum.

Probably the first address in Massachusetts in which lime was mentioned was printed in the report of the Massachusetts State Board of Agriculture for 1855.

The number of bulletins and circulars published in Vermont on the use of lime fails to indicate the full amount of publicity given to the subject. Bulletin 160 deals with the different kinds of lime and their relative value for agricultural purposes. Extension Circulars 32 and 34 relate to the same subject. The Department of Agriculture has issued little on the subject. The chief publicity has been through articles appearing in the newspapers and the publications of the Vermont Extension Service.

Just before the World War a number of field trials were made with lime in Vermont, and there was already some lime being used, but during the war its use decreased.

According to the best information available, the amount of lime used in 1923 was about 1,444 tons; and in 1927, 6,746 tons. The number of farmers using lime in Vermont increased in that interval from 316 to 1,061. It is said that there has been not only a rapid increase but that there are indications of a still greater increase in the future. This increase is attributed to publicity of various kinds together with demonstrations on the effect of lime.

The first use of lime at the New Hampshire Experiment Station was in 1904. It is not known that any lime was used in the state as early as 1900, very little was used by 1910. In 1920, 1,625 tons were used and in 1927, 6,034 tons. Much of this recent increase has doubtless been due to interest in alfalfa culture.

The Connecticut Experiment Station reports that no publications were issued in relation to the use of lime materials until about ten years ago. Since then at least six Extension publications have dealt with the subject.

It is stated that Dr. Jenkins, in 1908, outlined briefly some suggestions regarding the use of lime.

According to the best estimates available, about 10,000 tons of lime was used for agricultural purposes in Connecticut in 1922, and 30,000 tons in 1927.

Professor Bear of the Ohio State University says "the matter of liming has been given a great deal of publicity in this state through the columns of the agricultural press, through the activities of our extension circulars, and by the distribution of publications bearing on the subject. Both the experiment station and the college have aimed to have on hand bulletins bearing on this subject for distribution to those who have written in for information. The extension service has revised its bulletins from time to time as seen necessary, either because the previous bulletin was out of print or because newer information made revision desirable." He says, "You may be interested in knowing that recently an extended series of field plots with liming has been laid out at the Ohio Experiment Station." The public is generally familiar with the earlier liming experiments made under the direction of Ex-Director Thorne.

The Michigan State College through Prof. C. E. Miller reports that the need of lime has been stressed in one Special Bulletin and considerable space has been devoted to the subject in three others. One Extension Circular deals with liming, and six Circular Bulletins carry county maps showing the lime requirement of the different soil types in each county and also a general discussion of liming. Mention is made of the two soil trains run by the New York Central Railroad in the state of Michigan, also to a special sugar-beet train and to an alfalfa train; and on each soils were tested for the farmers and advice given as to liming.

Professor Miller says the use of lime was advocated in Michigan by Dr. Kedzie in 1889 or earlier, and that he had demonstration plots "showing the value of marl. The extensive use of lime in the state, however, has developed very largely in the last ten or twelve years."

The College of Agriculture of Cornell University has issued two Bulletins and one Leaflet on the use of lime during recent years. The State Department at Albany analyzes lime samples and publishes the results annually.

It is stated that lime was used in a small way in the state "a good many years ago, but it was never used to any large extent until machinery was developed for efficiently grinding limestone." The following are reported to be the amounts of liming materials used in recent years in the state, probably chiefly ground limestone.

| Year | Tons |
|---|---|
| 1916 | 165,000 |
| 1917 | 154,000 |
| 1921 | 136,000 |
| 1922 | 150,000 |
| 1923 | 157,000 |
| 1924 | 159,000 |
| 1925 | 160,000 |
| 1926 | 170,000 |
| 1927 | 180,000 |

It is believed that the publicity has had a marked effect on the recent increase, though recent economic conditions in agriculture have "had a lot to do with the retarding of the use of lime."

Last, but perhaps not least, I may mention Rhode Island. This Station has published about fifty papers relating to lime, in connection with which Dr. Hartwell has played a prominent part, a few also having been published by the Extension Department and by the State Department of Agriculture. The first work leading to the recognition of an injurious degree of soil acidity was begun in 1890, but striking results of the application of lime made July 27, 1891, between the rows of standing corn were not observed until 1892. The highly spectacular results with about thirty different kinds of crops were not secured until 1893. There was a long and unfortunate delay in accepting these results at their face value, because of a general belief among other station officials that similar conditions and actually injurious acidity did not exist in upland soils in other states.

Special attention should be called to the article entitled, "Recognition of the Acidity of Upland Soils," published in the eighth annual report for the year 1895, which perhaps more than any earlier article focused attention upon the fact that even upland well-drained soils were in need of lime.

No figures are available as to the quantity of lime used in the state, but it has become considerable. It is probably not yet used to anything like the extent that it should be.

Several states have sent no reply to the questionnaire or have delayed so long that the desired information has not come to hand.

### *Promotional Work of the Railroads*

The Illinois Central Railroad has operated several soil trains over its lines, "making tests for acidity and advising the farmers what to do in connection therewith." Much personal work has been done among the farmers; and limestone campaigns have been conducted in various counties along the New York Central Lines, but no records are available showing the effect of these efforts on lime shipments.

The Chesapeake and Ohio Railroad through its General Agricultural Agent, C. J. Jehne reports that it has run no agricultural trains in the "past few years," but previously did so. In 1927, however, the road hauled and distributed free, lime donated by

a company interested in its sale. Fifty carloads were thus distributed at the rate of four tons per farmer, or sufficient usually for about two acres of land. The application and planting were done in accordance with directions from the Extension Division of the Agricultural College at Morgantown, West Virginia.

It is believed that this work will result in much benefit to the railroad and to the agriculture of the region.

For the New York Central Lines, E. J. Leenhouts, general agricultural agent, reports that they have operated seven soil trains during the last five years, covering all of their Michigan territory and large portions of their Ohio, Pennsylvania, and West Virginia territory. The road has made a large number of limestone demonstrations throughout its territory at the rate of eight to a county. An active poster campaign has been conducted since 1922. The past spring a check-up of the results revealed the fact tat in the two-year period, 1926-27, twice as much lime was shipped into the entire territory as in 1920-21; and 2¼ times as much into the territory where the demonstrations were made, and 3 times as much into the territory which had the benefit of the soil-fertility trains.

In the Michigan territory 5½ times as much limestone was used in 1927 as in 1922, the increase in 1927 over 1926 being 32%, whereas the increase in the adjoining territory—served by other railroads—was only half as much. He says in conclusion, "We are satisfied that these campaigns brought about results which paid large dividends on our investment."

O. B. Price, agricultural agent of the same railroad, says that tests for soil acidity were made on all the soil trains operated in Michigan. These included both surface soils and subsoils. Farm-management problems were discussed and a written sheet of recommendations was passed out to each farmer present or his representative.

In 1922 and 1923 in co-operation with limestone companies and the Michigan State College, the New York Central Lines hauled free and distributed about 15 carloads of ground limestone—each containing about 50 tons. This was distributed to farmers in each of 15 counties at the rate of a carload to four men.

As a result of a questionnaire sent to these farmer co-operators five years later, one-third of them replied that they had used more limestone as a result of the demonstration, and 75% found the limestone beneficial; also 70% said that more limestone had been used in their communities as a result of the demonstration.

B. O. Hagerman, agricultural agent of the Pennsylvania Railroad, says, "I wish to advise that in the spring of 1927, over what is known as the Grand Rapids division, we ran a "lime, legume, and live stock train,"

"A separate car was placed at the disposal of each of the three departments at Michigan State College, and they equipped as they saw fit.

"With special reference to the soil test, will say that soil was tested on the train, several hundred tests being made.

"The effect of this publicity is somewhat difficult to determine, as we are not the only agency in the state advocating the increased use of lime. However, I will say that in the counties traversed by this special train, there was shipped in 1927, 38,466 tons of limestone.

"Our station reports show that in some of the counties there had never been any lime shipped previously, but during the following summer one agent alone reported four carloads."

***Summary***

Summarizing the figures that have been secured from various sources, evidence is afforded that in 17 states 2,422,146 tons of liming materials, chiefly ground limestone, are now being used in this country annually. In addition Maryland reports the use of several hundred thousand tons per year, and Georgia reports a "very large" tonnage.

Mention should be made of the wide publicity that has been given to lime by the National Lime Association through its *Agricultural Lime News Bulletin* and its numerous miscellaneous publications, also by co-operation with the railroads through the running of special demonstration trains. In 1923 such a train was run over the Baltimore and Ohio Railroad in co-operation with the University of Maryland and the eastern division of the National Lime Association. One end of the lecture coach was fitted up as a testing laboratory, where farmers could bring their soil samples and have them tested. During this trip one thousand prescriptions were written for liming, and sufficient liming materials were distributed to satisfy the requirements of 1,000 acres of land.

Much credit should be given to the farm press for the many articles that have been published in relation to lime and its use. In fact, no one can begin to estimate the importance of this form of publicity.

## Falling Boulders Wreck Shovel

A VERY unusual accident happened recently at the Fallings Springs quarry of the Casper Stolle Quarry and Contracting Co. of East St. Louis, Ill., when several large boulders weighing upwards of five tons each fell or slid from the high quarry face and struck one of the steam shovels with a result as shown by the photograph.

The rocks had evidently been loosened by previous heavy and continuous rain. The loss was estimated at $5000 and no attempt will be made to rebuild the equipment. The parts not injured will be used for repair parts for other shovels of the company.

Fortunately the accident happened in the early morning hours and no one was injured. F. H. Stolle, president of the company, aptly describes the accident as "being the result of nobody's fault."

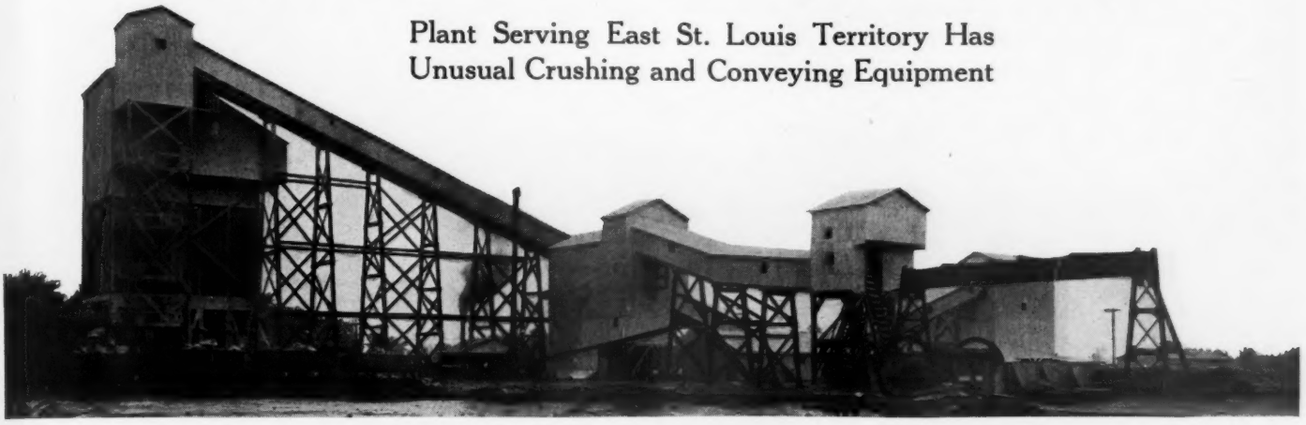
***Steam shovel at the Casper Stolle quarry, Falling Springs, Ill., wrecked by boulders***

## Canadian Asbestos in 1927

ASBESTOS production in Canada during 1927 was only slightly greater than in 1926, but higher prices raised the total valuation to 5.1% over the total figures for the preceding year, according to finally revised statistics just issued by the Mining, Metallurgical and Chemical Branch of the Dominion Bureau of Statistics at Ottawa. Shipments in 1927 amounted to 274,778 tons valued at $10,621,013 as against 273,524 tons at $8,977,546 shipped in 1926. The average value received by the operators in 1927 was $38.65 per ton as compared with $36.15 per ton in the previous year.

# Illinois Electric Limestone Company's New Crushing Plant

## Plant Serving East St. Louis Territory Has Unusual Crushing and Conveying Equipment



*General view of the new crushing plant of the Illinois Electric Limestone Co., at Falling Springs, Ill.*

IN THE MAY 15, 1926, ISSUE OF ROCK PRODUCTS was described in detail the plant and quarry operations of the East St. Louis Stone Co. This company's quarry and plant was taken over, June 1, 1927, by the Electric Limestone Co., of St. Louis, Mo. Recently the name was changed to the Illinois Electric Limestone Co.

The quarry is one of the oldest in the St. Louis territory, having been operated by the East St. Louis Stone Co. for 25 years, and prior to that by Niemes and Riemann, who used the quarry as a source of rubble stone for building purposes. This last named firm operated the quarry for about 30 years, beginning in 1873.

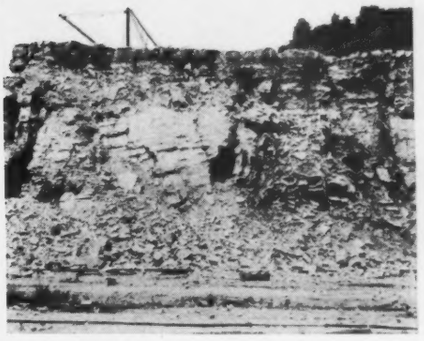
*A portion of the quarry with shovel at work stripping above*

While being operated by Ralph E. McLean, as president of the East St. Louis Stone Co., the quarry development was kept far in advance of crushing plant technique. It was his aim to develop a large tonnage of cheap rock and to modernize and enlarge the crushing plant when this tonnage was assured. However, the old plant of this company never was enlarged to compare with the potential tonnage possibilities of the quarry. The capacity of the old plant was 400 to 500 tons per day.

*The result of a small primary shot at the Illinois Electric Limestone Co. quarry*

The new owners of the property, deciding that the market possibilities had not been adequately developed, immediately dismantled the old plant, and on the same site, constructed a new screening and crushing plant, which when their equipment is all installed as planned, will have a capacity of 5000 tons per day. The present capacity of the plant is about half that amount.

Construction of the new plant was started November 21, 1927, and on March 1, 1928, the plant was in operation. It required approximately 100 days to complete the construction work and to get the plant actually running. Considering the time of year that the construction was undertaken, and the size of the installation, this is good example of what can be done in the way of rock-plant construction, when in the hands of experienced men.



*Shattered rock resulting from primary blasting at the Falling Springs quarry*

The foundations of the buildings and of the various units are of reinforced concrete. The structural members are wood covered with corrugated iron.

It remains to install two secondary and two finishing crushers and possibly addi-

*View of the Falling Springs plant looking toward St. Louis, a part of which can be seen in the distance*

tional finishing screens to bring the tonnage up to 100 cars per day. Primary crushing and the balance of the screening equipment are all of ample size to take care of this increased tonnage as they now stand.

### *Designed to Be an All-Electric Operation*

The Illinois Electric Limestone Co. derives its name from its modern milling and quarrying features. It will be an all-electric, motor-driven, crushed-stone producer from the drilling to the final screening operation. At present, however, there are a few steam-driven units that are being replaced by electric-power units just as fast as the manufacturers make the deliveries. One of the new electric shovels arrived during the latter part of August, 1928.

The quarry is located at Falling Springs, Ill., which is the freight shipping point for the company and on the St. Louis (Mo.) Terminal Railroad Association's rails. Falling Springs is 8 miles south and east of St. Louis, and on clear days quarry operations can be easily seen from the company's executive offices in the Bell Telephone building, St. Louis.

Rock producers located on the Terminal railroad have a decided advantage over others not so favorably located. This association is owned jointly by 32 different railroads entering St. Louis, and extra switching charges are saved the producer by this arrangement. The average saving will run between $8 and $10 per car, which on a basis of 100 cars per day is quite an item.

### *Limestone Deposit*

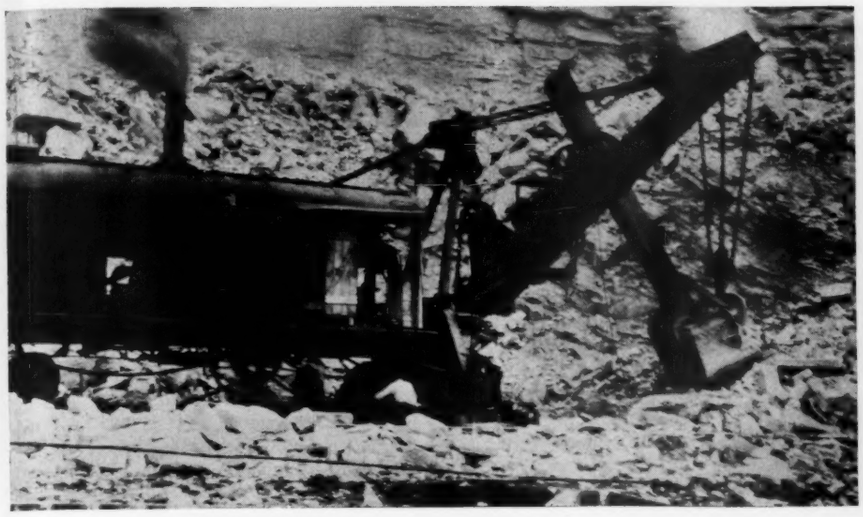
The bluff, from which the quarry secures its stone, is a dome-like structure about six miles through its major axis and parallel to the Mississippi river. The bluff has a maximum height of 170 ft., although at Falling Springs the maximum height is about half that figure. The area between the river and the quarry is a flat, flood plain, some two miles wide, and it is used mostly for agricultural purposes. East St. Louis is located on this flat area also.

*Stripping operations at the Falling Springs quarry*

*Close-up view of stripping, showing the nature of the top of the limestone deposit*

The rock is a hard limestone of Pennsylvanian age, and is locally referred to as the Mississippian limestone. One of the very noticeable features of the quarry is the large number of horizontal bedding planes. The thickness of these beds varies from a few inches to very seldom over a foot, with no clay or foreign matter in the bedding planes. This feature is of economic importance and is reflected in the saving of powder in primary shooting and a saving of time and labor for secondary blasting, as well as producing a clean stone.

The face of the quarry has gradually been enlarged until at present it assumes the shape of a semi-circle, roughly 1200 ft. in diameter, with a depth of 500 to 600 ft. The face has

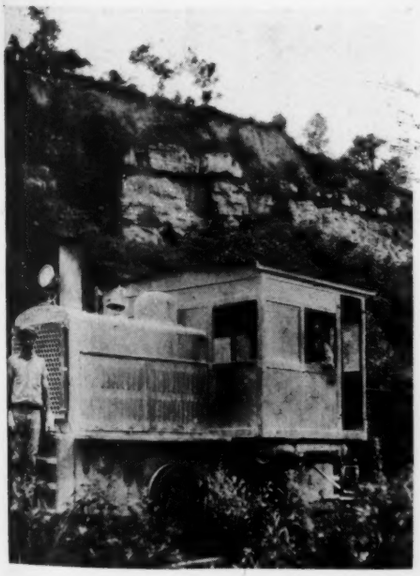


*Loading rock in the quarry of the Illinois Electric Limestone Co.*

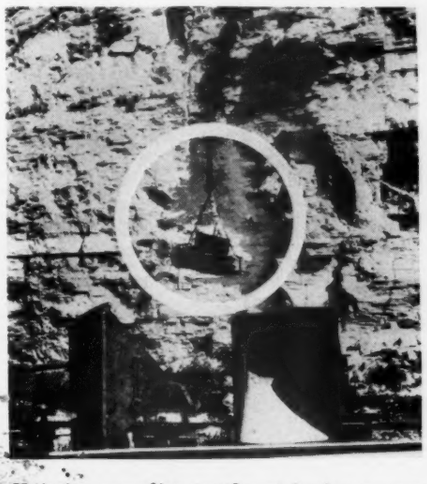
an average height of 75 ft., the highest point being about 85 ft. above the floor of the quarry, which is perfectly flat. The crushing plant is built on this quarry floor. On account of the short haul and the nature of the quarry floor motor trucks might have been used to haul the stone to the crusher.

### *Loading and Blasting*

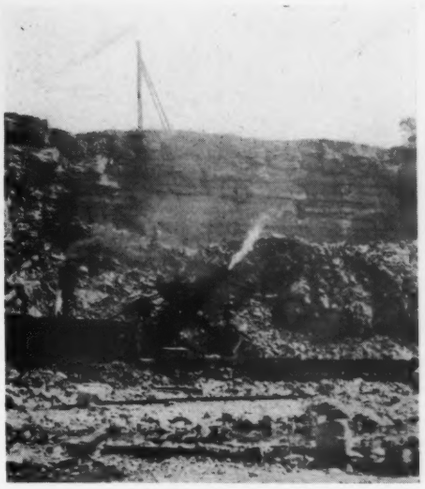
Primary shooting is done by drilling holes 2 ft. below the floor of the quarry with a No. 14C, Sanderson-Cyclone well drill, using a 5⅝-in. bit, 25 ft. long, weighing 1800 lb. About 150 ft. of 2-in. rope is used on the drum. The hardness of the stone can be judged by the average speed of drilling—5 ft. per hour with these tools. This rig is driven by an 18-hp. Cook gas engine although eventually this will be driven by an electric motor. The holes are drilled 20 ft. back from the face with 20-ft. spacing. They are then loaded with 400 to 600 lb. of 40% dynamite in 4x16-in. cartridges supplied by the Illinois Powder Co. The holes are shot with Cordeau-Bickford and are battery fired. Recently 40 holes were shot at once, giving an estimated tonnage of 120,000, of rock suitable for shovel loading. This gives 3000 tons per hole and on the basis of 500 lb. of powder per hole makes a production of 6 tons of rock per pound of explosive. This lower powder cost can be accounted for as partly due to the many horizontal bedding planes.



*Locomotive used at the Falling Springs plant to switch gondola cars for loading*



*Hoisting supplies to the stripping operation at the Illinois Electric plant*



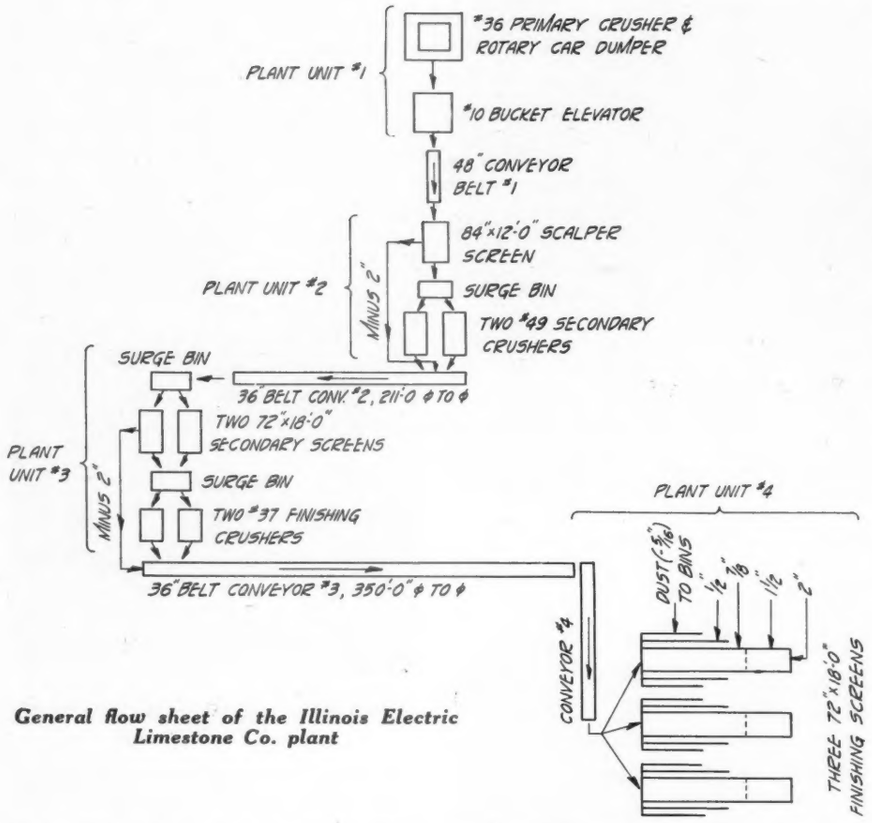
*Steam shovel loading to dump cars in the quarry*

Water is supplied to the well drill, and all of the rest of the plant as well, by a steam-driven, Gardner duplex pump having a 2½-in. suction and 2-in. discharge. This also will be replaced by an electric-motor-driven centrifugal pump.

### *Stripping and Loading*

The average thickness of the overburden is close to 25 ft. and consists mostly of a sandy loam. At present, the greater portion of this material is removed with a No. 18B Bucyrus steam shovel. This piece of equipment is to be replaced by a Marion electric

*A general view of the quarry which clearly shows the horizontal bedding planes, and the amount of overburden*




***General flow sheet of the Illinois Electric Limestone Co. plant***

shovel. The balance of the stripping is done with teams and slip scrapers, the dirt being dumped where the steam shovel can pick it up again.

The top of the deposit is very uneven, with many fissures, making the final clean-up a comparatively difficult operation. Some of these fissures will have a depth of from 8 to 10 ft., and the dirt from those pockets has to be shoveled out by hand and moved to a point where team and scraper can reach it

Supplies for the well drill and other equipment needed for stripping are hoisted by a horse-operated winch from the quarry floor.

Most of the rock is loaded by a Bucyrus No. 70-C, railway type steam shovel with a 2½-yd. bucket. In addition, the quarry has an Erie No. 30 steam shovel on crawler treads which is equipped with a 1-yd. dipper.

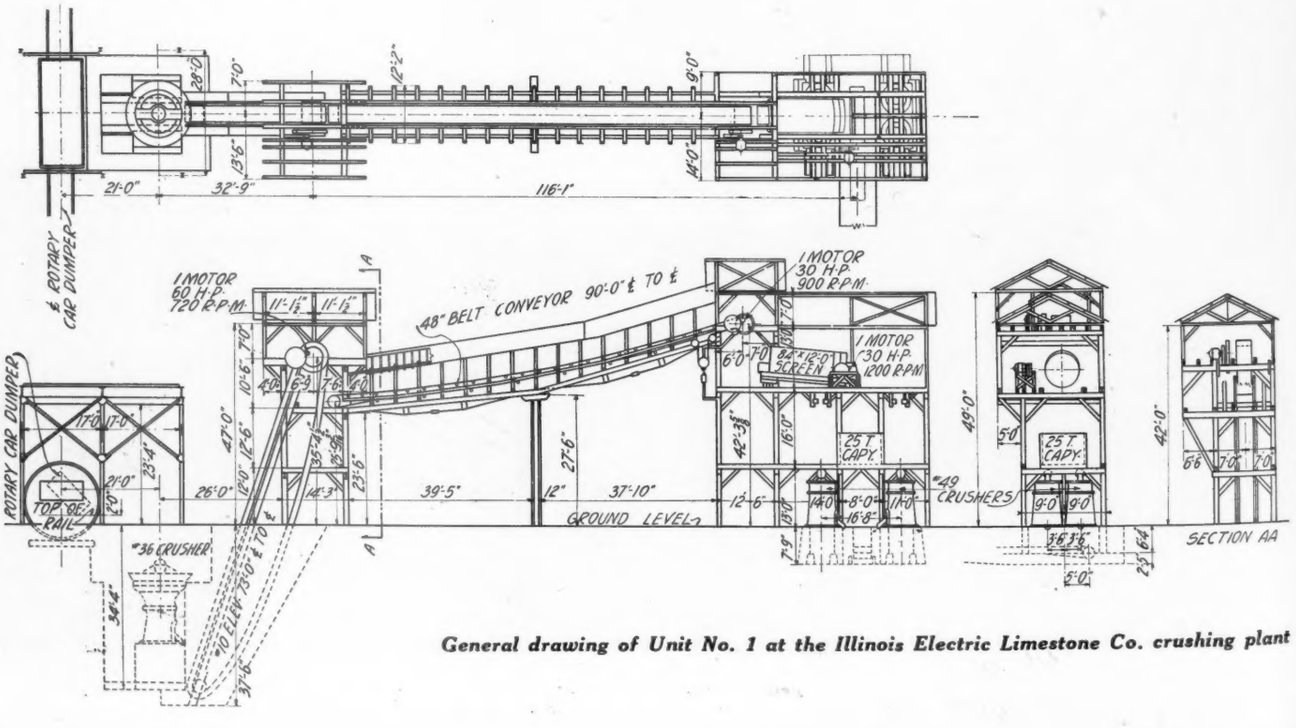
As already noted electric shovels will soon displace the present steam shovels. One of the new electric shovels was delivered to the plant during the latter part of August and is now in operation. This shovel is a No. 37, Marion electric, full revolving, 2-yd., full caterpillar type. The company has ordered a Marion Type 490, full revolving, full caterpillar, electric shovel with a 2¼-yd. bucket. These shovels are especially designed for the heavy duty work encountered in this quarry.

The shovels load into 4-yd., 36-in. gage, Western side-dump cars, and are hauled in three trains of from 5 to 9 cars each. Two of the trains are pulled by 8-ton Whitcomb gasoline-driven locomotives, and the other by a 12-ton Whitcomb locomotive.

The main haulage track is laid out in the form of a circle and the operation of loading and hauling is conducted by the smaller Erie shovel loading as many cars as it can before a second rock train arrives, in which event the partially loaded train passes on to the Bucyrus shovel and the loading is completed. By this arrangement one train is loaded, one is partly loaded and the third train of empties is ready to leave the crusher house. Rails are 56-lb. with wood ties.

The rock is dumped at the crusher by an air-operated hoist. The plans for the finished plant under development call for the use of 30-ton, standard-gage, all-steel, ore cars, which will be dumped by an air-driven rotary dumper. This equipment is now at Falling Springs and as soon as the present rush of summer orders are filled the installation will be completed. The compressed-air equipment for the rotary dump will be supplied by the Curtis Co., St. Louis, Mo.

The quarry is equipped with flood lights and in the event of seasonal rush orders both




***General drawing of Unit No. 1 at the Illinois Electric Limestone Co. crushing plant***

*A general view of the plant at Falling Springs*

quarry and plant operate two shifts.

Air for secondary drilling is furnished at 100-lb. pressure by a converted 9x10-in. Gardner, steam-driven, Type 52 compressor running at 280 r.p.m. and delivering 200 cu. ft. of air per minute. The alterations in progress include the installing of a shorter compressor piston, and belting the compressor to a 40-hp. Wagner Electric Co. motor running at 1140 r.p.m. The air intake line of this compressor is equipped with a "Protectomotor" air filter made by Staynew Filter Corp. of Rochester, N. Y. Walter Le Pere,

*Rotary car dumper and bucket elevator*

master mechanic, made the changes in this compressor, and stated that the compressor had been running several years without any repairs aside from occasional tightening up the crank and wrist pin bearings. Air from the compressor is delivered to a receiver made from an old vertical steam boiler, from which feeder lines serve the quarry. The compressor is housed in the same building with the motor generator set used for field exciters on the synchronous motors driving the various crushing units. The switchboard and fuse panels for the plant are also located in this building.

Air for operating the new rotary dumper will be supplied by an additional compressor, the foundation of which is now in place in the compressor building.

### *Preliminary Crushing*

The plant consists of four separate operations or units as they are all referred to by the operators. All the units are housed in separate buildings connected by passageways for the different conveyor systems. The conveyors are designated as No.'s 1, 2, 3 and 4 and are numbered in the order of their progressive use.

The plant unit known as No. 1 includes the primary crusher and elevator. Unit No. 2 (middle building) contains the scalping screen and the secondary crushers. Unit No. 3 houses the secondary screens and the finishing crushers, and No. 4 has the finishing screens and loading department.

The rock from the quarry trains is dumped directly to a No. 36 Kennedy-Van Saun gearless gyratory crusher driven by a 150-hp., direct-connected, synchronous motor, which drives the eccentric 140 r.p.m. This crusher has many unusual and interesting features both in the design of the crusher and the driving mechanism. The initial crusher has a capacity, it is claimed, of from 250 to 500 tons per hour, making a reduction of from 2½-in. to 6-in. size. The crusher will receive rock up to 36x72 in. The total weight of the unit is 150 tons.

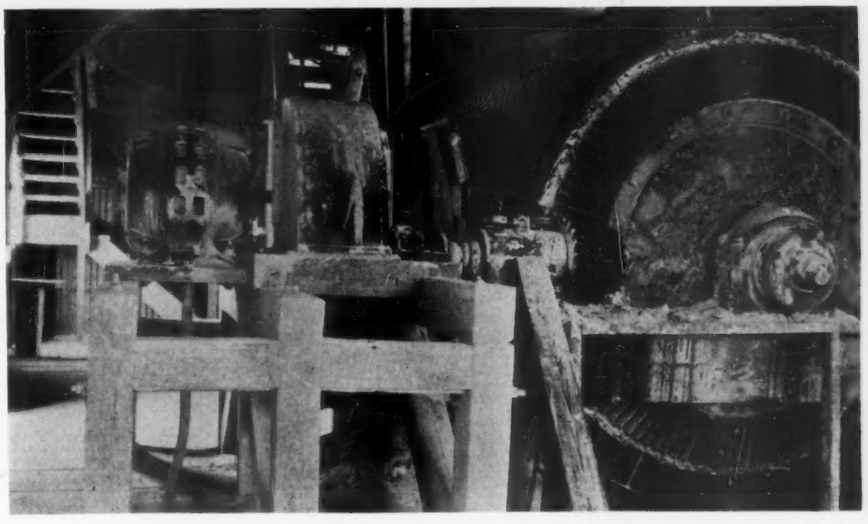
The eccentric and eccentric sleeve run in a bath of oil circulated and filtered by an oil pump belted to the rotating field of the synchronous, direct-connected motor. The eccentric is of the ball-and-socket type, runs cool, and it is claimed with a considerable saving in power over the usual type of gyratory of the same capacity. Owing to the gearless features, the crusher runs very quietly when empty and with the added fea-

*Dumping cars by air hoist, with the rotary car dumper, which is being installed, at the right*

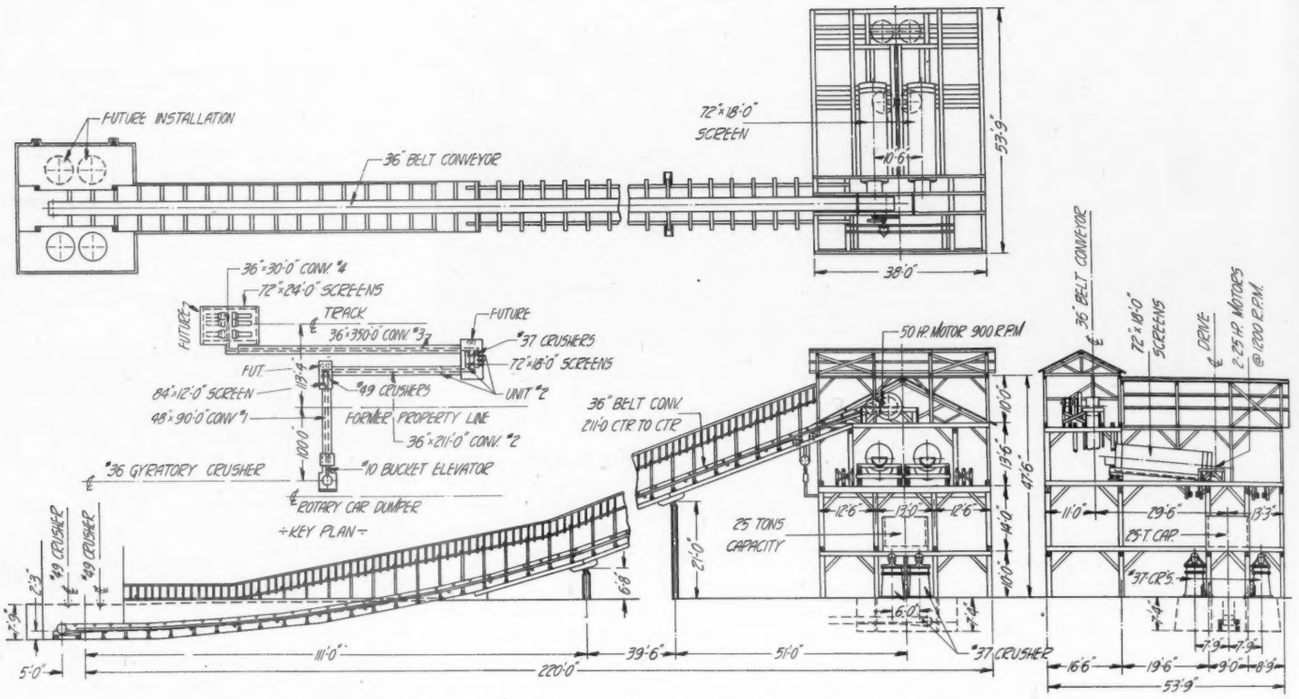
ture of a larger number of strokes and eccentric turns per minute, which makes for a harder and quicker blow of the crusher spindle.

The rotating field of the 150-hp. synchronous motor is built into the pulley, which is bolted to the driving disks. The motor field rotates, of course, in a horizontal position.

The crusher is in a pit 34 ft. 4 in. below



*Scalping screen direct-connected to its motor at the Falling Springs plant*

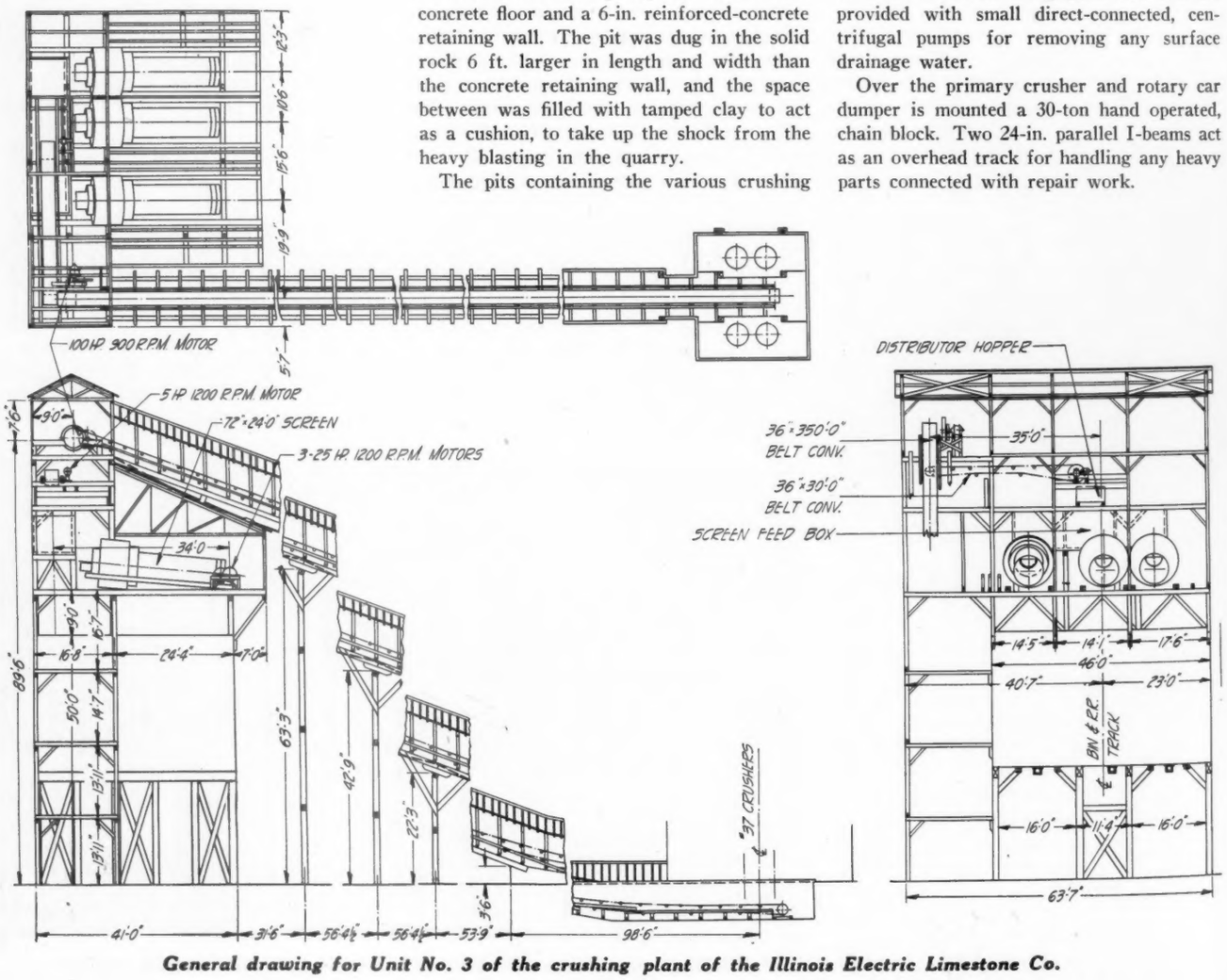



***General drawing for Unit No. 2 of the crushing plant of the Illinois Electric Limestone Co.***

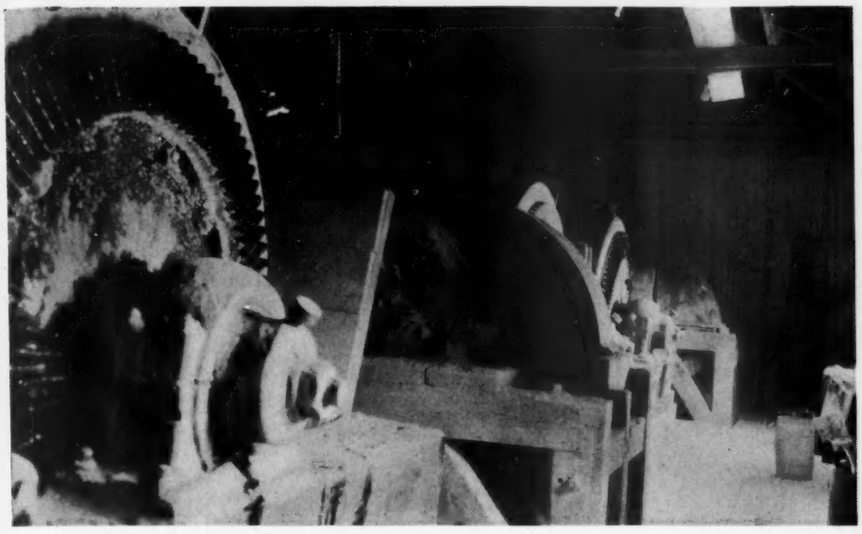
the floor of the main quarry level with a 4-ft. concrete floor and a 6-in. reinforced-concrete retaining wall. The pit was dug in the solid rock 6 ft. larger in length and width than the concrete retaining wall, and the space between was filled with tamped clay to act as a cushion, to take up the shock from the heavy blasting in the quarry.

The pits containing the various crushing units are all below the ground level and are provided with small direct-connected, centrifugal pumps for removing any surface drainage water.

Over the primary crusher and rotary car dumper is mounted a 30-ton hand operated, chain block. Two 24-in. parallel I-beams act as an overhead track for handling any heavy parts connected with repair work.




***General drawing for Unit No. 3 of the crushing plant of the Illinois Electric Limestone Co.***



*The sizing screens at the Illinois Electric Limestone Co. plant*

The crusher discharges to a No. 10, Kennedy-Van Saun bucket elevator. This elevates the rock 70 ft. and discharges over an apron made of old rails, which are set at an angle of 45 deg. to a 48-in., 12-ply, belt conveyor. This elevator has a capacity of 500 tons per hour and is driven by duplex gears direct-connected to a 60-hp. type H.V. Fairbanks-Morse induction motor running at 720 r.p.m. This motor as well as all others that will be described later are 3-phase, 60-cycle, 440-volts. The elevator has 99 buckets, 42 in. x 12 in., which are riveted to a 12-ply rubber belt supplied by the United States Rubber Co.

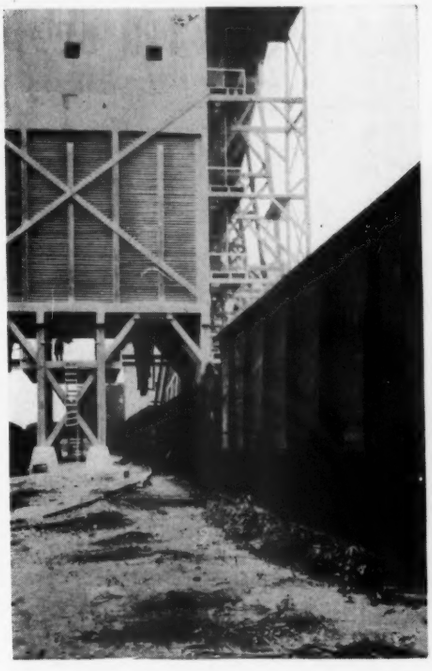
*Unit No. 4, and the loading bunkers, showing the louvre type of construction*

For a belt of this thickness a larger than ordinary head and tail pulley is provided for the bucket elevator. The head has a diameter of 72 in., and the tail pulley 36 in.

### *Splicing a 12-Ply Rubber Belt*

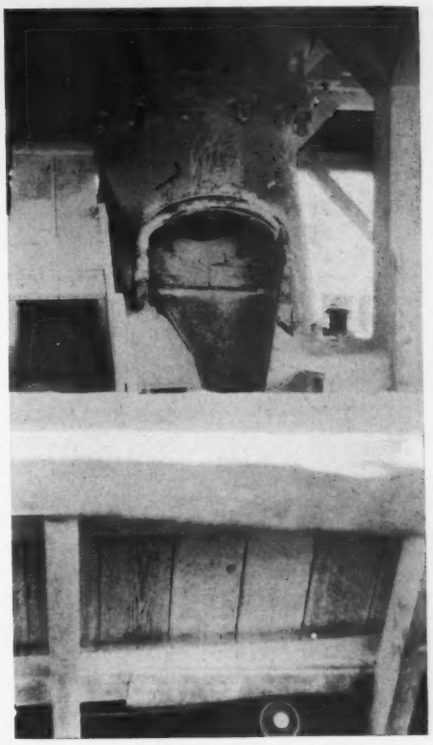
One feature of interest to many operating men is to know just how the other fellow splices the two ends of an elevator belt. Some belts are cut longer than necessary and the two ends allowed to lap. Others prefer to cut the belt to exact length and supply an additional piece to make the lap. This latter procedure was followed at this plant with their heavy 12-ply elevator belt. The second piece is made long enough to catch five buckets on each side of the joint. The bucket rivets go through only the one thickness of the smaller lapped section. Between each bucket is an additional row of rivets ($\frac{5}{16}$ in.), which pass through both pieces as well as a row of rivets at each of the four loose ends. The buckets are held on by 41 rivets (¼-in.) placed in two rows. The 10-ply conveyor belts are all cut to length and spliced with alligator type lacing.

The conveyor receiving the rock from the bucket elevator carries it a horizontal distance of 90 ft., and at the same time elevates it a distance of 16 ft., where the rock discharges to an 84-in. by 12-ft. Kennedy-Van Saun, heavy-duty, revolving screen. The belt conveyor to the scalping screen is driven by a 30-hp. type H.V. Fairbanks-Morse induction motor, running at 900 r.p.m., and direct-connected to the conveyor by a duplex gear reduction, enclosed in a sheet-iron housing.



*The louvre type construction is well shown in these loading bins*

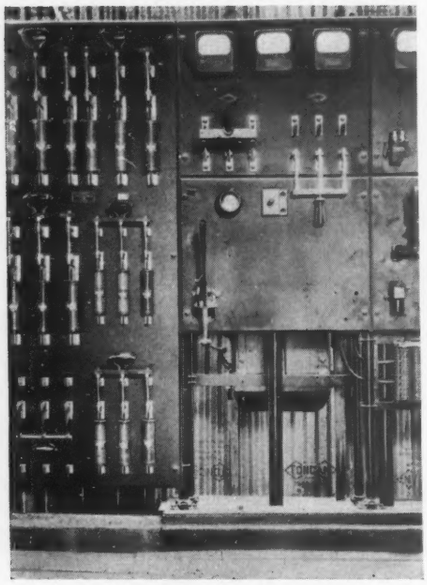
The length of this belt, including that portion necessary for the take-up, is 195 ft. The take-up feature is the ordinary vertical, sliding pulley type with two 100-lb. counterweights. The take-up pulley is 30 in. in diameter.



*One of the secondary crushers and the spout, left, from sizing screens bringing minus 2-in. stone to join the crusher discharge*

The scalping screen is driven by a 30-hp. Type H, Fairbanks-Morse induction motor running at 1200 r.p.m. and direct-connected to the screen by gear reductions. All the Fairbanks-Morse motors are ball-bearing and equipped with "Alemite" nipples for greasing. The scalping screen has three 4-ft. sections of 2-in. round holes.

The oversize from the scalping screen falls to a small storage bin of 25 tons capacity, which acts as a surge storage, and this bin discharges to two Kennedy-Van Saun gearless secondary crushers (No. 49), each having a capacity of 65 to 100 tons per hour, reducing the material to pass a 1½-in. ring. These two crushers are each driven by direct-connected 75-hp. synchronous motors, which drive the eccentrics at 200 r.p.m. The crushers weigh 65,000 lb. each. These two crushers have the same mechanical and driving features as the primary crusher.



***Fuses and switches controlling the four units of the plant. The fuses for individual motors are behind this board***

### *Secondary Crushers*

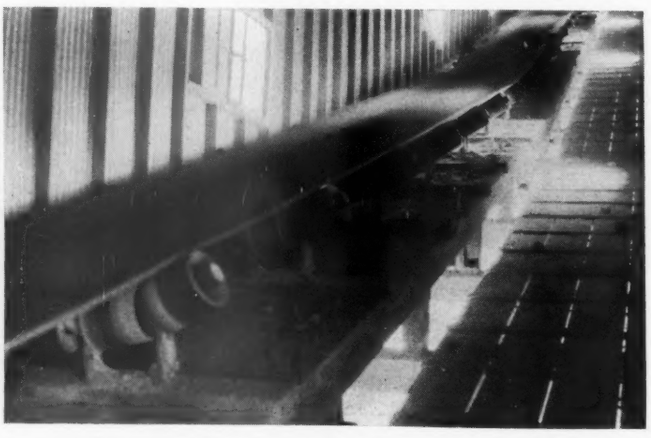
The crushed material from the two No. 49 crushers falls direct to a 36-in., 10-ply, rubber conveyor belt. The minus 2 in. from the scalping screen is spouted direct to this belt and joins the rock stream from these two secondary crushing units. This conveyor carries the rock a horizontal distance of 211 ft. and elevates it 40 ft. The head and tail pulleys of this conveyor have a diameter of 48 in. and 30 in. respectively. The direction of travel of the belt is at right angles to the flow of rock that comes from the secondary crushers. This belt is driven by a Fairbanks-Morse, type H.V. 50-hp., induction motor running 900 r.p.m., and is direct-connected to the head pulley by enclosed gear reduction. Take-up on this belt is by means of a vertical sliding 24-in. diameter pulley, the weight of which is increased by two concrete counterweights of 100 lb. each.

This belt conveyor discharges to two secondary screens 72-in. by 18-ft. of the same type as the scalping screen punched with 2-in. round openings. The two secondary screens are each driven by individual, direct-connected, 25-hp. type "H" Fairbanks-Morse motors by means of enclosed gear reduction. The oversize from these two screens falls to a 25-ton storage bin which feeds two Kennedy-Van Saun gearless gyratory finishing crushers (No. 37), driven as in the case of the other gyratory crushers, with individual, direct-connected, 50-hp., synchronous motors. These motors drive the eccentrics at 250 r.p.m. The crushers each have a capacity of 50 to 100 tons per hour for the class of material being handled. The discharge of these two crushers falls to a 36-in. 10-ply rubber conveyor belt. This belt is the longest conveyor in the plant and carries the rock a horizontal distance of 335 ft. and elevates 90 ft. Between centers distance is 350 ft. Length of belt including take-up is 714 ft.

The minus 2-in. material from the secondary screens is spouted direct to the No. 3 conveyor, and joins the discharge material from the No. 37, or finishing crushers.

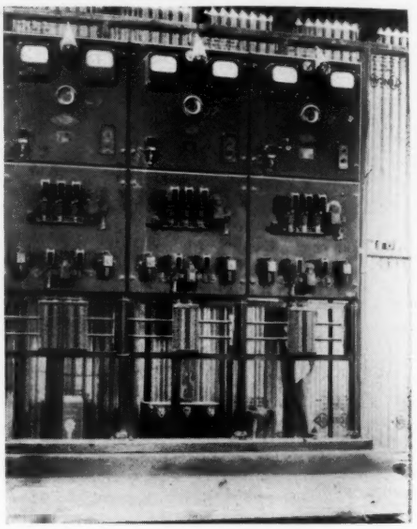
This long conveyor is driven by a 100-hp. Fairbanks-Morse Type H.V. induction motor running at 900 r.p.m. direct-connected to the head pulley by enclosed gear reduction. The head pulley has a diameter of 4 ft. and the tail pulley 3 ft. This conveyor is known as No. 3, and has the same type of take-up as the other two belt conveyors. The carrier rolls are spaced on 5-ft. centers with return idlers on 8- to 10-ft. centers on all belt conveyors, and are of the ordinary troughing and flat carrier type equipped with grease cups for lubrication. Carrier rolls are bolted to timber structural members, which is unusual in a conveyor of this length, on account of the danger of the belt running out of line because of warping or twisting of the wood frame. However, this belt has been in operation eight months and centers on the carrier rolls very accurately. Additional side guide rolls are provided at frequent intervals, but at this plant they are not really needed. Any spill from the belt is prevented from falling on the return portion of the belt by a solid timber floor between the carrier and return portion of the belt. The crushed limestone from the finishing crushers (No. 37) also meets the conveyor at right angles to the direction of travel of the belt.

The two No. 49 crushers and the two No. 36 crushers are located on the same side of the belt in each installation. Foundations are in place for two more of these crushers, which will be placed on the opposite side of the belt to those already installed, making four secondary and four finishing crushers discharging to the No. 2 and No. 3 conveyor belts, respectively.



***Belt conveyor which carries the rock from the secondary crushers to the sizing screen***

The material from conveyor No. 3 falls direct to a short horizontal cross conveyor, which carries the crushed rock to a point above the center of the three finishing screens. The rock drops from this cross conveyor to a small feed bin, and by means of suitable baffles is divided between the three finishing screens. This conveyor is a 30-in. rubber belt, 10-ply and runs on 36-ft. centers. This conveyor is driven by a 5-hp. direct-connected Fairbanks-Morse, Type H, induction motor running at 1200 r.p.m. Speed reduction is by means of Type 6-D, Falk speed reducer.



***Portion of the switchboard controlling the synchronous motors on the crushers***

### *Finishing Screens*

There are three finishing screens, each 72 in. in diameter by 24 ft. long, each with two dust screens. The main body of this screen has 12 ft. of ⅞-in. round holes, followed by 12 ft .of 1½-in. round holes. The first dust screen is 8 ft. long, and of woven wire with ½-in. openings. The outer dust screen is 6 ft. long and is of woven wire with $\frac{3}{16}$-in. openings. The oversize from the finishing screens goes as 2-in. stone to the storage.

The five products from the finishing screens fall to the storage bins located directly under the screens. From these storage bins the crushed rock is loaded to the cars for shipment by suitable gates at the bottom of each bin. The bins have a total capacity of 30 carloads, and are divided into five sections for the different sized products. These sizes are classed as 2-in., 1½-in., ⅞-in., ½-in., and dust or screenings.

### *Storage Handling Facilities*

During certain seasons of the year the screenings are usually loaded direct to gondolas for agricultural limestone, but in the

slack season this material is loaded into small cars and pulled up an incline and dumped for storage. For this purpose three Koppel cars, two being side-dump and the third an end-dump are used. By this arrangement it is possible to extend the length of the storage pile without superficial trestle construction.

The three cars are pulled up the incline by means of a steam-driven contractor's hoist located at the foot of the incline, the cable from the drum passing through a snatch block located at the end of the dump. Agricultural limestone can be loaded to motor trucks from the bins and spouts that serve the cars on the storage pile.

### *Unusual Type of Construction Used in the Storage Bins*

The sides of the storage bins are of the louvre type, and with the high bank of material in the bins there is practically no spillage or leakage through this type of construction. The rock itself tends to wedge into the openings and make its own wall, and by this type of construction the walls carry a high percentage of the total weight of the rock.

At the present time only two of the finishing screens are used as they have ample capacity to handle the tonnage that is being shipped. When the additional crushers are installed provision has been made in the plans for the installation of extra secondary and finishing screens in the event that they are deemed necessary.

Each of the finishing screens is driven by a direct-connected 25-hp. Fairbanks-Morse, Type H, induction motor. Speed reduction is by enclosed gears.

Rock shipments are loaded from two sets of gates on two separate tracks, so that two cars can be loaded at the same time. The company does its own switching with a "Brymo" type Whitcomb gasoline locomotive.

### *Power Supply and Transformer Substation Equipment*

Power is delivered to the plant at 33,000 v. and dropped to 2300 v. at an outdoor substation across the tracks from the main plant. Near the compressor building is a second set of transformers which step the current down to 440 v. Both of these transformer stations are of General Electric Co. equipment.

### *Data for Starting Equipment of the Crusher Units*

The starting equipment for all the motors is of the push button type and the motor can be started or stopped from the substation or at the point of use by separate sets of buttons. Each plant unit is provided with a set of fuses located in the substation as well as the usual protection for each motor. The individual fuse boxes are placed behind the main switchboard. When any piece of equipment is being repaired these fuses are removed and the box locked with a padlock to prevent anyone starting the motor while the work is in progress.

***This picture of the Falling Springs plant well illustrates the size of the plant and also shows its picturesque surroundings***

Following are the data connected with the starting equipment for the three synchronous motor, crusher units:

| CRUSHER NO. | 36 | 49 | 37 |
|---|---|---|---|
| Serial No. | 7516 | 7519 | 754 |
| Volts, line | 440 | 440 | 440 |
| Volts, field | 125 | 125 | 125 |
| Volts, control | 440 | 440 | 440 |
| Amperes, line | 163 | 83 | 55 |
| Amperes, field | 34 | 19 | 11 |
| Size | C.S. | C.S. | C.S. |
| Horsepower | 150 | 75 | 50 |
| Phase | 3 | 3 | 3 |
| Cycles | 60 | 60 | 60 |

This starting equipment was all supplied by the Electric Machine Manufacturing Co. of Minneapolis, Minn.

### *Contemplated Changes*

Following are a few of the items of construction and other changes that are contemplated. Most of the equipment for these changes is on the job awaiting a favorable opportunity to be installed.

***Rear view of the Illinois Electric Limestone Co. plant***

The duplex gear reductions on the various pieces of equipment are to be replaced with Falk herringbone gears. This will do much toward reducing power requirements and eliminating noise and vibration.

Track scales are to be installed; the Terminal Railroad is now weighing all the cars from this plant. A building is to be constructed over the car dumper when that piece of equipment is installed. Conveyor system for the agricultural limestone storage pile in place of the present track and cars and the erection of a new machine and repair shop complete the list of projects under this heading.

The plant was designed by Kennedy-Van Saun Co. of Danville, Penn., and the equipment in the plant supplied by the Kennedy-Van Saun Manufacturing and Engineering Corp., New York City. F. E. Toennoges, Danville, Ill., is chief engineer for the Illinois Electric Limestone Co.

The company employs a total of 70 men, and maintains a boarding house at the plant and boards about 40 men. The balance of the employes are married and most of them live in East St. Louis, driving to and from the plant in their own automobiles. The company also has a small commissary run in connection with the office for the convenience of the men. Excellent board is supplied at $1 per day.

### *Officers of the Company*

The executive officers of the Illinois Electric Limestone Co. are John D. Moore, president: J. B. F. Melville, first vice-president; Robert Morrison, Jr., second vice-president; George M. Urquhart, secretary and treasurer; Ralph P. Jacoby, assistant secretary and treasurer; Fred C. Murphy, formerly of Brownell Improvement Co., Chicago, Ill., manager of sales; and Charles Tigges, assistant manager of sales. The operating staff consists of A. C. Dodd, superintendent; Walter Le Pere, master mechanic; Adolph Bilzing, quarry foreman, and E. Rosenberg in charge of the plant office and commissary.

# The Manufacture of Gypsum Plasters

## Leaves from an Operating Man's Note Book—Part VIII.—Laboratory Control of a Simple Kind, Conclusions on the Philosophy of Mill Management

By W. B. Lenhart

Assistant Editor, Rock Products, Formerly Consulting Chemist and Engineer, Long Beach, Calif.

IT IS NOT the intention here to give an elaborate outline of the chemical methods that could be used in a laboratory where refinements and extreme accuracy are essential, but to enumerate the simpler chemical and physical methods that any plaster superintendent or foreman can apply to assist him in maintaining a uniform and high quality product. Most of these methods are "old stuff" to most mill men, but the author will attempt to enliven them with observations that might have been overlooked.

The laboratory and equipment or plant control need not be pretentious or expensive. The room for conducting this work should be removed from the mill proper, as dust or uncleanliness will interfere with the results. In fact, outside of the balances and scales, most of the equipment can be purchased at the "five and ten."

### *Setting Time of Stucco, Casting and Finishing Plasters*

The first requirement is to establish the amount of water necessary to give a mixture that will, after stirring, be stiff enough to make a pat roughly 2½ in. in diameter, and from 1½ to 2 in. in height. Once this ratio of plaster to water has been established for the particular stucco, it should not be changed. For rock gypsum stuccos, 100 grams of plaster to 70 c.c. of water will usually approximate the above conditions. For gypsite stucco a smaller amount of water is usually required.

By keeping these ratios constant, and the method of manipulation constant, the diameter of the pat formed will indicate the age, plasticity and sand-carrying capacity. A pat 2½ in. in diameter, with the above sand-plaster ratio, should carry at least 20 shovels of sand per sack of 100 lb. A pat 6 in. in diameter would indicate a sand capacity of 10 to 12 shovels per sack.

Similarly, for fresh stucco the pat will "stand up," as the saying goes, indicating that that particular material is not suitable for casting or finishing purposes. The aged stucco, of a suitable casting plaster, with the ratios given, should give a pat 6 to 7 in. in diameter. This water-carrying capacity then would indicate the density of the finished casting. Keene's cement, with the ratios given, would result in so sloppy a mix as to be unusable, which still further indicates that were it mixed to normal working consistency it would result in a denser cast than casting or finishing plaster. This we know to be the case from extensive experiments.

The setting time is usually obtained by noting the time the stucco is added to the water, and the time when a 100-gram Gilmore needle will just leave an impression on the surface of the pat. The difference will be the setting time. There are several methods or determining the time of set, but this method will be found satisfactory for most cases. It is the usual practice to file off the point of the needle to make it blunt, and the diameter at this point should be about 1/10 in.

Some wallboard and tile manufacturing companies wish a 5-min. setting time, and for this class of material it is usual to take the setting time as that point which gives a sharp, clean fracture, when the edge or tips of the pat are broken with the fingers. For this purpose it is well to leave several spike-like projections on the surface of the pat. The setting time by this method will be found to be about 2 min. longer than that observed by the use of the Gilmore needle.

By adding the stucco to the water and allowing the particles to become wet before stirring, any tendency towards lump formation will be eliminated. The mixture then should be stirred with a putty knife for not over 20 seconds, and the pat then placed on an oiled piece of glass. Care should be taken not to mix any longer than is absolutely necessary, and the operator should learn to conduct this operation in a standardized manner. It is sometimes very difficult for two men to check each other's work for this reason.

The addition of soluble salts to stucco to decrease the setting time for wallboard, or tile work, is usually not sufficient, as the speed of the setting reaction will be governed somewhat by the velocity of solution of the salt. To arrive at this setting time, it is usually necessary to combine a soluble salt with raw gypsum after first cooling the stucco.

There are a host of salts that will decrease the setting time, but their cost eliminates all but a few. Those mostly used include sodium chloride, alum and potassium sulphate. For wallboard and tile the addition of a manufacturing cost of 30 to 40 cents per ton for accelerators is a serious matter, considering the low price the mill usually receives for the product.

### *Fibered Hardwall*

As previously outlined the sand-water-plaster ratio when once established should be kept constant for testing this class of material. For rock gypsum the following proportions indicate a sand carrying capacity of 20 shovels of sand per sack and is a convenient amount for laboratory purposes.

In testing hardwall plaster it is the usual practice to use sand taken from pits in the locality that the plaster is being shipped. To illustrate, the sands in southern California act very differently from the sands in Seattle. The latter sands contain some accelerating substances which have to be offset by larger amounts of retarder.

Sized sands that are ordinarily used for testing purposes do not work satisfactorily with plaster, as the setting time is extremely long. Purer silica sands, likewise, give long setting times that are too long to be of value for laboratory purposes. Similarly coarse sands, with a minimum of fines, give longer setting times than the finer mesh sands.

It is well to keep in the laboratory a large sample of sand which suits the particular purpose for a standard. It is difficult to keep a standard plaster sample on account of its changing with age.

In regard to the above proportions of sand and plaster: A shovel of sand can be taken as weighing 15 lb. and at 20 shovels per sack would correspond to 300 lb. of sand to 100 lb. of plaster, or a ratio of 3 to 1 by weight. It is interesting to note that this ratio corresponds to a 2 to 1 ratio by volume for all practicable purposes.

With these constant proportions, here again the consistency of the mix will indicate the age and sand carrying capacities of the plaster. An old plaster, under these conditions, or one that will not carry the sand, will show itself by producing a pat that will not "stand up," but will tend to flatten out to a thin slab. The larger the diameter of this pat the less valuable the material is for hardwall purposes.

Samples of gypsite plasters (that if loaded with anything like 20 shovels of sand per sack would be non-plastic and very difficult to "push") examined by the author gave pats between 5 and 6 in. in diameter. To reduce the labor effect, or to give plasticity, this type of plaster is usually not loaded with over 12 shovels of sand per sack. However, with this small amount of sand, coupled with the other natural properties of gypsite, this type of plaster gives an extremely hard and satisfactory wall, and personally were I to build a house for my own use I would lean

toward the use of this material.

If the regular run of plaster from the mill will carry more or less sand than the figures above quoted, a different ratio might become necessary. The point is, though, whatever ratio is established, it should not be changed from day to day but should be held uniform. Then any change in the uniformity of the products can be more easily noted.

By constructing the pat, as indicated by Fig. 3, it will be noticed that the plaster starts to set by first forming a kernel, or several kernels, near the middle of the pat. Once these kernels form they rapidly enlarge. It requires roughly 30 minutes for this kernel to grow to within ¼ in. of the surface. From this point on the growth slows up greatly, dragging out sometimes for hours before the set comes to the surface. For this reason it is customary to take the setting time point at that time when the pat has set within roughly ¼ in. from the surface.

This setting time will vary considerably, but if the plaster sets within the limits of 3 to 6 hours under the above conditions, it will meet with satisfaction on the job. However, if setting times faster than 3 hours or slower than 6 hours are secured, it does not necessarily mean that the plaster is not usable, but it does mean that the odds are against the stuff. Under the working conditions that are usually found the variations are so great, variations in the methods of mixing, variations in sands, cleanliness of mixer or mortar box, skill of the operator, etc., that it is impossible to give an exact statement as to what would be the best setting time; so the next best thing is to strike a happy medium. Thus materials that set outside of the limits given might meet with satisfaction. Too, on account of this wide variations, it is better to slightly under retard than to over retard.

Referring to the pat with the outer scum of unset plaster, this condition can be traced to the crystallizing process which forces the impurities (retarder) to the surface, and if this scum were removed it would probably be found to contain a greater amount of retarder than the heart of the pat. This condition is similar to the natural process of securing clear ice from muddy water.

There is no direct, simple method of testing for retarder that has come to the writer's attention, except that given already, but in this case the scum could be removed and allowed to set separately. After the heart and scum had set, these could be ground and recalcined at a temperature of 330 deg. F., thus redeeming the stucco, and liberating the retarder and the accompanying alkali. Then by means of the indicator phenolphthalein a rough quantitative analysis could be made. The indicator does not show the presence of retarder or the alkali in set plaster.

Very often one meets with the remark from the man mixing the mortar that "after

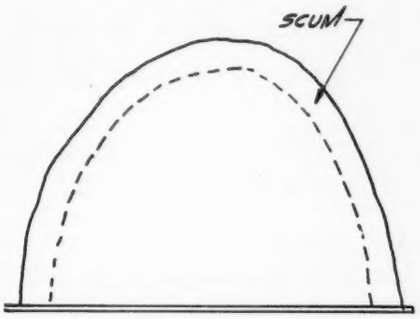



***Fig. 3. How a pat of plaster sets***

the mud is mixed water settles out of the batch." This condition is often noticeable in the laboratory pats and simply means that the plaster either has too much water to start with, or is not up to standard as regards plasticity.

This loss of water might be due to the coagulation of the semi-colloidal stucco itself. There is considerable evidence that calcined gypsum when mixed with water forms a intermediate colloidal gel. Due to the action of time, plus small amounts of absorbed moisture, this structure is sufficiently weakened that on addition of more water the gel, which is first formed, is further weakened, permitting a portion of the enclosed liquid to settle out of the mass.

It is not usually necessary or expedient to use the Gilmore needed for testing sanded plasters for the setting point, but a thin darning needle or small diameter wire is used. Try the pats about once per hour for the first four hours, and then once every 30 minutes until set. If a large blunt needle is used, and jabbed into the pat too often, there is a distortion of the materials which breaks the crystalline structure as fast as the crystals gain strength, and an indefinite setting point can result.

The pats, after they have set for several hours, can be broken in the fingers and will give an idea as to the ultimate strength. It used to be the practice to lay great stress upon tensile strength and daily, systematic tests were made in approved ways, but in recent years this point has been ignored completely and greater stress laid upon "spread" and sand-carrying capacities. Every effort is made to give the contractor a material that will satisfy his ideas of yardage, and to satisfy the workman's ideas of ease or workability. As is usual in other cases, the ultimate consumer has been forgotten.

### *Use of Fresh Plaster*

Very often, where the mill is located in the same district that the plaster is being used, the plaster will arrive on the job so fresh that it is still warm. This plaster will require considerably more water than ordinarily, and it will require a trifle more time for the plaster to become thoroughly wet. This condition often brings forth the complaint "the material sets in small balls in the mixer or mortar box and at the same time is 'hard to push.'" These balls, as they are generally called, are usually about the size of the end of the thumb, and when the plasterer's trowel strikes one of these lumps it tears a streak in his wall at that point. He then jumps to the conclusion that the plaster has "set." Actually these balls will be found to be spheres of dry sand and plaster that has not become wetted. A trifle more water and a trifle more time correct this trouble.

Where plaster is shipped in paper bags it is a simple matter to stencil, preferably in code, the date of shipment of the contents of the sack. If the material is shipped in jute sacks, different colored wire ties can be used for each month. As a rule this can be done at a very small cost and will prove of value in running down complaints that arise. In these cases it is possible to get some information from the dealer that would give the age of the shipment, but they are often none to careful in seeing that the older plaster is used up before the fresher.

The setting time of fibered hardwall changes slightly over long periods of time. For the first two months the change is so slight as to be hardly noticeable, but after one year's storage the setting time has about doubled. This is not serious in itself, as plaster a year old is usually aged to such an extent that it is practically worthless anyway.

There is much pro and con discussion as to the effect of temperature on the setting time, but for practical purposes we do know that plaster shipped into a hot, dry climate should have a faster setting time then were the reverse true. A long setting plaster in a hot climate is liable to result in "dry outs," which is a term meaning that the plaster has dried out before crystallization has finished. It is the custom to lower the amount of retarder in hardwall plaster about 1 lb. per ton during the summer months.

Experimenters working with gypsum stuccos should differentiate between hot and cold stucco, fresh and aged or even slightly aged material. Even expressing the age is not sufficient in itself, as climatic conditions affect the stucco. In a dry arid climate, such as will be found in the state of Nevada, plaster will undergo less change in six months than would be the case were the same plaster stored in San Francisco for two weeks.

### *Wallboard and Tile Stucco*

Where material is shipped to a wallboard manufacturer it is good practice to test the adhesion properties on a small piece of paper similar to that used by the manufacturer of the wallboard. This can be done by adding to 100 grams of stucco, 15 grams of sawdust and enough water to give a stiff mix. This material is then spread on the piece of paper as above mentioned, and a second piece laid on as a top. After the pat has set, dry slowly in an oven, care being taken not to heat over 65 deg. C. Better still is to let

the sample board dry out at room temperature.

### *Fast Drying*

Fast drying is apt to cause recalcining of the stucco at the bond, causing what are known as "peelers." This complaint is quite common, and the trouble is invariably laid on the plaster, whereas nine times out of 10 it is due to the fast drying or the use of a "sized" paper.

If excessive amounts of chemicals have been added to the plaster for acceleration purposes, these salts have a tendency to come to the surface, materially weakening the bond between the paper and plaster.

If the raw gypsum is known to have a high content of siliceous or gritty material, care must be exercised in supplying it to a wallboard manufacturer on account of the flinty materials dulling the saws in the manufacturer's plant, with the consequent delay, expense, and nuisance involved.

Wallboard manufacturers all have their own ideas as to what is best for their needs. Some companies want a coarse material, claiming that this grade of stucco gives a stronger board and more yardage per ton of stucco secured as well. Others have just the reverse ideas.

Where yardage is desired a fresh, finely ground stucco, which will require a maximum of water for mixing, will be best to secure this result. The board in this case will not have the strength that an aged stucco would produce. This is self-evident when it is recalled that the evaporation of the excess water will leave a certain amount of voids. The greater the amount of voids the weaker the board. Other things being equal, the weight o a unit area of wallboard would indicate the amount of plaster used and its comparative strength.

The only advantage that a coarse stucco would have is in the ease of wetting and pugging and the mixability of the sawdust with the mortar. There is certainly no advantage to be gained in strength or yardage.

### *Two Points Often Overlooked*

Two other points wallboard manufacturers are apt to overlook; one is that the longer the setting time, within reasonable limits, the larger the crystals formed and the stronger the board. The other is that the less the material is handled, moxed or jarred until thoroughly set the stronger the board. Sawing of the board before it has thoroughly set breaks the crystallization at the edges, weakening it seriously at that point.

Lastly, all plaster mill superintendents have at some time or other felt that some of the complaints that come to their lot are manufactured by the sales department to serve as an alibi or the slump in their department, and if it were not for their super-sales ability, etc., what a pretty mess things would be in—which all comes under the head of "boloney"!

# Effect of Curing on Apparent Free Lime Content of Portland Cement

By Arthur J. Pool

**Chief Chemist, Peninsular Plant, Consolidated Cement Corp., Cement City, Mich.**

ACCORDING to Lerch and Bogue* the ammonium acetate test for uncombined lime in portland cement reacts positively in the presence of $Ca(OH)_2$, as with CaO, but they consider the presence of more than traces of $Ca(OH)_2$ in fresh cement as generally improbable, and that any $Ca(OH)_2$ formed by the hydrolysis of the silicates by atmospherc humidity or by a spray of water on the clinker probably becomes carbonated very rapidly, forming $CaCO_3$, which reacts negatively in the test.

During the course of some recent investigations it was found desirable to determine the uncombined lime in several samples of portland cement. Determinations of free lime were made by the ammonium acetate method on the freshly ground cements, and on the same cements after curing for one, three, and seven days in cloth sacks in air of laboratory. The results obtained appear to indicate that a comparatively large amount of $Ca(OH)_2$ may exist in fresh cement, and that subsequent carbonation may not proceed as rapidly as might be expected. The results of the tests are as follows:

EFFECT OF CURING ON APPARENT FREE LIME CONTENT OF PORTLAND CEMENT

| Age at Test | Uncombined CaO—Per cent Cement A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Fresh..... | 0.41 | 0.76 | 0.53 | 0.43 | 0.98 | 1.23 |
| 1 day..... | 0.88 | 1.16 | 1.13 | 0.88 | 1.35 | 0.41 |
| 3 days..... | 0.41 | 1.20 | 0.69 | Tr. | 0.47 | 0.50 |
| 7 days..... | Tr. | 0.88 | 0.53 | 0.85 | 0.94 | Tr. |

It will be observed that the apparent free lime content was in general higher after the cements had cured for one day than it was in the fresh samples, and that in some of the cements the apparent free lime content was higher after three and even seven days' curing. This increase may be attributed to partial hydrolysis of the silicates by atmospheric humidity.

It is the writer's understanding that some contracts for good-sized orders of cement have been given with the requirement that the free lime should not exceed a certain specified amount. In view of the evident importance becoming attached to the determination of free lime in commercial cements, and in consideration of the possibility of fluctuations in the apparent free lime content as determined by the ammonium acetate method, it would seem that rigid precautions should be observed in sampling and in the protection of the samples from the atmosphere so that reasonable assurance may be had that the results obtained for free lime will actually represent as nearly as possible the amount of this compound present in the cement and not the amount of $Ca(OH)_2$ or mixture of $Ca(OH)_2$ and CaO.

It is a recognized fact that the presence of any considerable amount of free lime in cement is objectionable, but the presence of $Ca(OH)_2$ in amount which would ordinarily occur in the average cement would not be appreciably deleterious.

It is conceivable then that a perfectly good cement may be rejected on the belief that it contains too much free lime when in reality it contains very little or none of this compound.

*"Determination of Uncombined Lime in Portland Cement." By Wm. Lerch and R. H. Bogue, Portland Cement Association Fellowship, National Bureau of Standards.

## Cement Production in Canada in 1927

A FURTHER advance in cement production in Canada was recorded in 1927 and as a result a new high mark was set up for this industry, according to finally revised statistics just issued by the Mining, Metallurgical and Chemical Branch of the Dominion Bureau of Statistics at Ottawa. Shipments during the year reached a grand total of 10,065,865 bbl. valued at $14,391,837, as compared with 8,707,021 bbl. at $13,013,283 shipped in 1926.

Plants in Quebec, Ontario, Manitoba, Alberta and British Columbia were the sources of the total Canadian output. Quebec mills maintained their position as leading producers and accounted for 46% of the total Canadian production in 1927; Ontario mills contributed 35% of the total. Alberta's production advanced 42% during the year, but a slight falling off was recorded in sales in Manitoba and British Columbia.

The average selling price per barrel, f.o.b. plant, was as follows: Quebec, $1.16; Ontario, $1.37; Manitoba, $2.50; Alberta, $2.17, and British Columbia, $2.26.

Imports of portland cement into Canada in 1927 totaled 19,354 bbl., averaging $4.52 per bbl.; in 1926 the average value was $3.68. Portland cement exports were recorded at 249,694 bbl. invoiced at $308,144. The supply of cement made available for consumption in Canada in 1927 was the greatest on record and amounted to 9,835,525 bbl. Total fixed and current assets of the six firms operating in the cement industry in Canada in 1927 were $40,509,319. Employment was furnished 2370 employes.

# Sand Settling and Devices for Settling and Classifying Sand

## Part IX. Mechanical Classifiers and Dewaterers

By Edmund Shaw
Editor, Rock Products

THE MECHANICAL CLASSIFIERS so far described, the sand drag and the screw, are applications of forms of conveyors which have long been in use for other purposes. The next form to be discussed, the Dorr classifier, has a mechanism that was designed for classifying and nothing else. It does not resemble closely any conveying mechanism used in other machines, although there is a "ladder" or raking conveyor that has the same intermittent action obtained in another way.

The Dorr classifier was invented by a metallurgist in 1904 and as soon as it was introduced it became a standard machine to use with tube mills and for de-sliming in metallurgical work and for ore dressing. It did not find much use in the rock products field, which at that time was very little developed as compared with what it is today. Since the expiration of the patents on the original machine, it, or a machine much resembling it, has been made by a number of manufacturers, and it is now coming into more general use in this field. The Dorr Co. of late has studied the problems of the rock products industry and re-designed this classifier to meet them, as well as having designed new forms of classifiers and dewaterers which will be described later.

The Dorr classifier, shown in Fig. 37, has the settling box in the form of an inclined trough that is common to all mechanical classifiers. The method of removing the settled sand, in which it varies from the others, is by the use of mechanically operated rakes. These are carried by hangers from bell-cranks connected by rods that terminate in rollers. The rollers press against cams attached to a cam shaft at the head of the machine, and the action of these cams lifts and lowers the rakes at opposite ends of the stroke. Cranks attached to the rakes give them a horizontal motion, pulling them forward when they are lowered and pulling them back when they are raised. In this way the sand is raked out.

The feed is admitted across the center of the trough and the overflow goes out over an adjustable overflow lip, or "tailboard," as in the other classifiers described. The sand is raked out on a drainboard common to all forms. But owing to the action of the rakes the sand has a chance to settle between the strokes and it drains considerably in this interval. Sprays can be applied here to wash back the clay and fines. It is this combination of draining and washing with the methods of adjusting the mechanism that makes the machine such an excellent classifier.

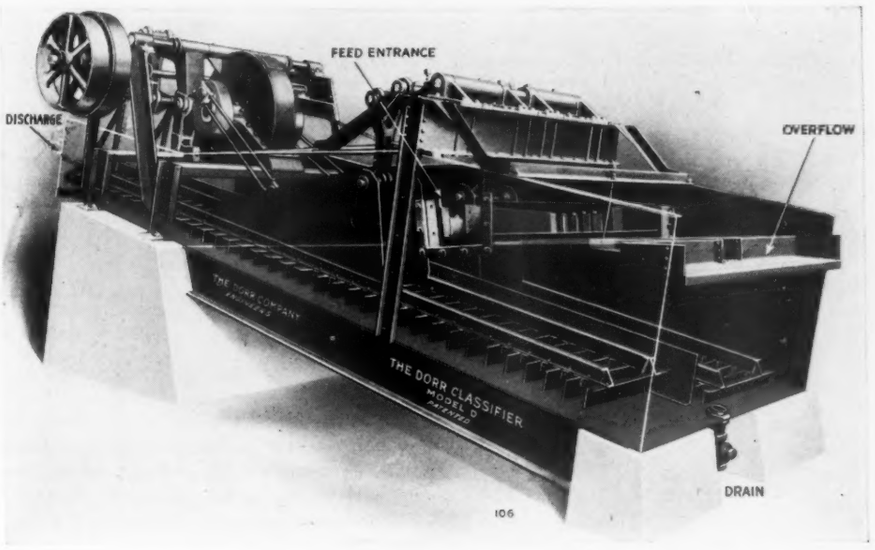



*Fig. 37. A sand classifier having mechanically operated rakes for recovering the sand*

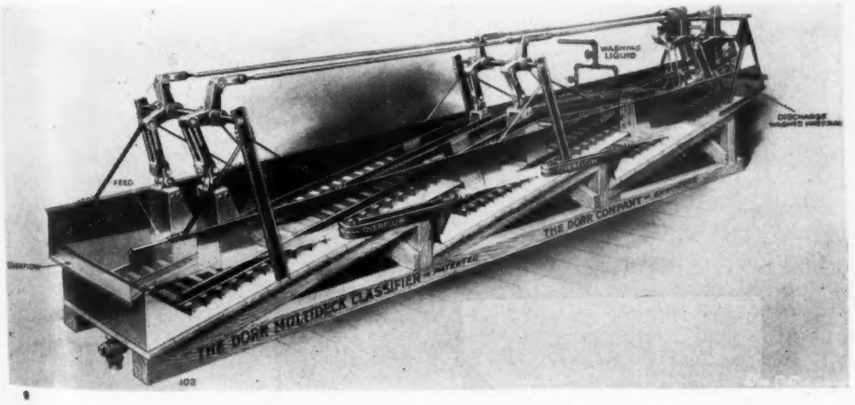



*Fig. 38. A multiple deck classifier which has a series of troughs and rakes*

At the overflow end there is a baffle which prevents the material from flowing out of the machine with a surface current, and this baffle may be raised and lowered as well as the overflow lip, and also set closer to or farther from the overflow.

There is no machine in the classifying and dewatering field that has received so much study as the Dorr classifier, and many articles have been written on its operation. Taggert's "Handbook of Ore Dressing" devotes several pages to it.

Unfortunately for the purpose of these articles, all the examples are taken from the work of the machine on metallic ores, and this makes the amount of 200-mesh and mi-

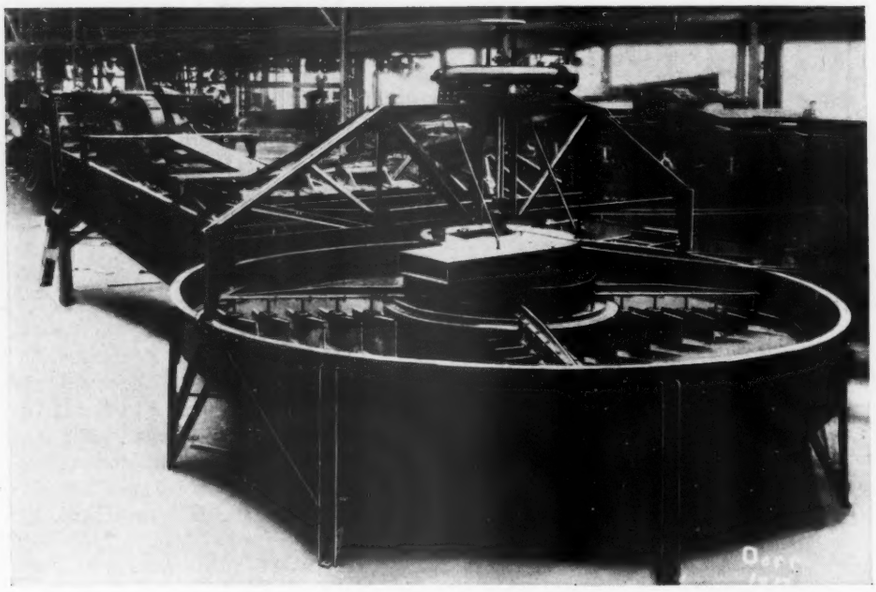


***Fig. 39. The bowl classifier, showing the round flat tank with the sweeps for carrying the sand to the center***

nus 200-mesh appear very high, because the fines in this sand discharge are almost wholly of heavy sulphides. Working on siliceous material the amount of fines in the sand discharged would be much lower. But the effect of changing the adjustment is none the less apparent.

EFFECT OF HEIGHT OF TAILBOARD ON OVERFLOW PRODUCT

| Mesh | Standard height of tailboard | Tailboard raised 4 in. |
|---|---|---|
| 60 | 0.2 | 0.5 |
| 80 | 2.5 | 1.4 |
| 100 | 7.6 | 5.2 |
| 150 | 24.8 | 22.5 |
| 200 | 38.3 | 32.8 |
| –200 | 61.7 | 67.2 |

This shows that, as in the other forms of mechanical classifiers described, the higher the overflow lip the finer the mesh sizes of the grains in the overflow.

The speed of the rakes (the number of strokes per minute) has a pronounced effect on the classification, as the higher speeds keep the finer particles from settling and going out with the sands. This is shown in the following:

EFFECT OF SPEED CHANGE ON CLASSIFICATION

| | 20 strokes per min. | | 12.5 strokes per min. | |
|---|---|---|---|---|
| Mesh | Sand | Overflow | Sand | Overflow |
| On 60 | 42.9 | ..... | 42.9 | ..... |
| 100 | 72.1 | 1.2 | 67.9 | 0.1 |
| 150 | 89.3 | 2.6 | 74.8 | 0.9 |
| 200 | 92.0 | 14.0 | 87.0 | 6.3 |
| –200 | 8.0 | 86.0 | 13.0 | 92.7 |

Note that the percentages in the above table are cumulative percentages, and so are the percentages in the table which follows. This is of more general interest, as it shows the effect of dilution. As explained in the first article of this series, the thinner the pulp the more readily the fine particles settle. The example shows that almost twice as much of the minus 200-mesh particles went into the sand when there was 25% of solids in the overflow as when there was 11.1% of solids in the overflow, and some 48- and 65-mesh stuff is carried over.

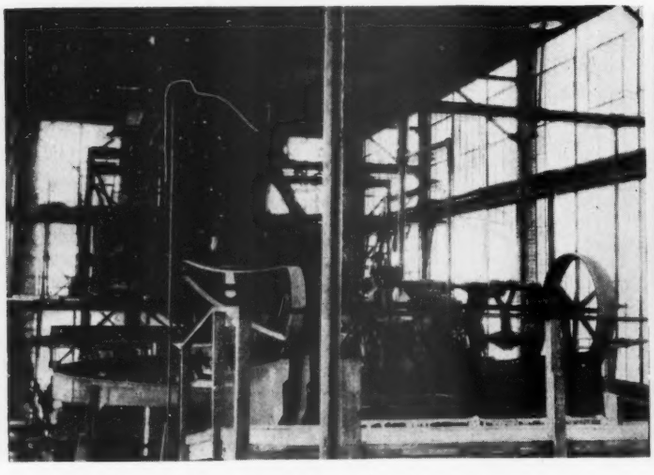
EFFECT OF PULP DILUTION ON CLASSIFICATION

| | 11.1% solids in overflow | | 25% solids in overflow | |
|---|---|---|---|---|
| Mesh | Sand | Overflow | Sand | Overflow |
| 28 | 19.5 | ..... | 32.2 | ..... |
| 48 | 55.0 | ..... | 71.8 | 0.6 |
| 65 | 79.0 | ..... | 84.9 | 5.9 |
| 100 | 90.0 | 1.1 | 91.5 | 14.9 |
| 150 | 94.9 | 5.5 | 94.4 | |
| 200 | 97.1 | 10.2 | 95.7 | 85.1 |
| –200 | 2.9 | 89.8 | 4.3 | |

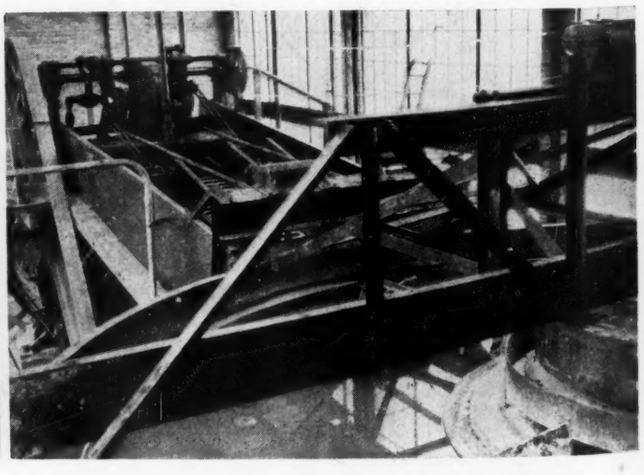
The Dorr classifier is made with one, two, three and even four sets of rakes working in the same trough. The capacity, other things being equal, is determined by the width of the machine, and the wider machines have duplicate sets of rakes rather than wider rakes. But all are driven from a single head motion.

Three interesting machines have applied the principles of the original classifier and all of them have found a use in the rock products field. The first of these is the multiple deck classifier, which is a series of troughs and rakes, the rakes all run by the same head motion. The troughs are set so that the sand discharged from one feeds into the next. Clear water is fed into each trough, but in the first the sands are given a very thorough washing and rinsing. This machine has been successfully applied to the washing of silica sand and other rock products. It is shown in Fig. 38.

The Dorr bowl classifier (Fig. 39) employs a flat tank as a settling basin. Sweeps in the bottom, provided with rakes set at an angle, bring the settled sand to a central opening through which it passes into a Dorr classifier of the type just described. This draws it out and washes and rinses it. The special province of this machine is fine material, and it has been very successful in saving the fines of phosphate rock in the Tennessee phosphate field. A number of plants there are equipped with this machine.



***Installation of a bowl classifier at the plant of the Michigan Silica Co.***



***Close-up view of the classifier at the Michigan Silica Co. plant***

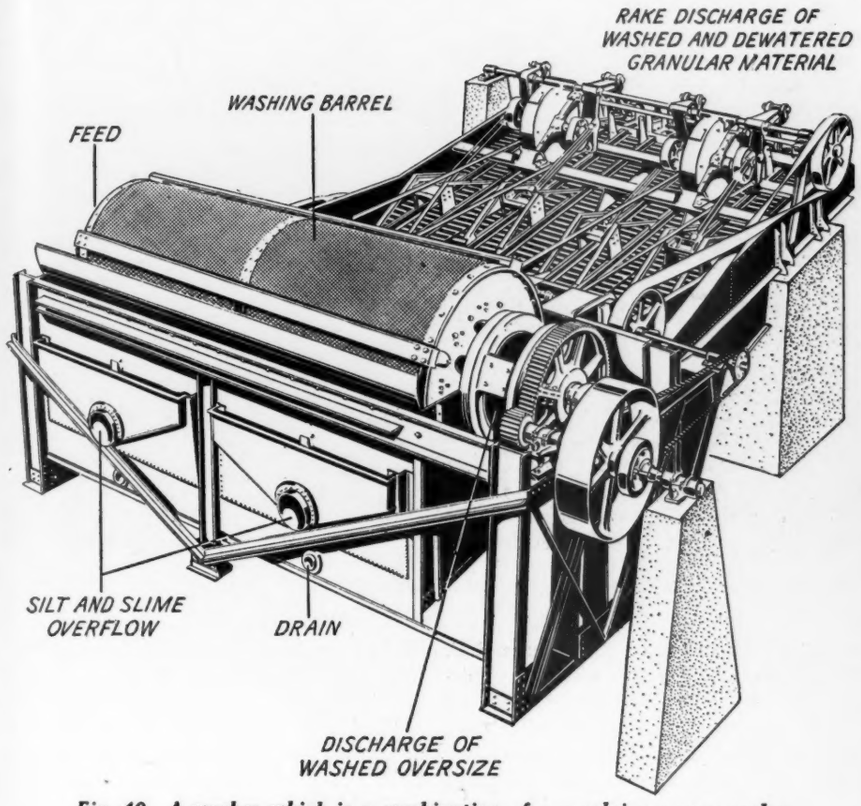



***Fig. 40. A washer which is a combination of a revolving screen and a sand classifier***

It is also used in saving the fines from limestone plants.

The Dorr washer (Fig. 40) is a combination of washing trommel (revolving screen) and Dorr classifier. The coarser material is recovered as the oversize of the screen and the finer as the product of a Dorr classifier. This machine was designed originally to wash iron ore, with which it was unusually successful. Later it was applied to the washing of crushed stone and sand and gravel, and it has been equally successful with these materials. Some gravels that could hardly be washed in plants of the ordinary design have been made into good material by this machine. Besides being a good washer it has the advantage of simplifying the plant and reducing headroom.

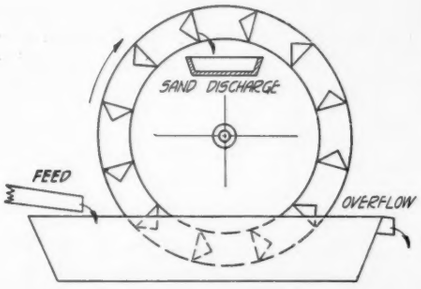



***Fig. 41. The simplest form of the dewatering wheel***

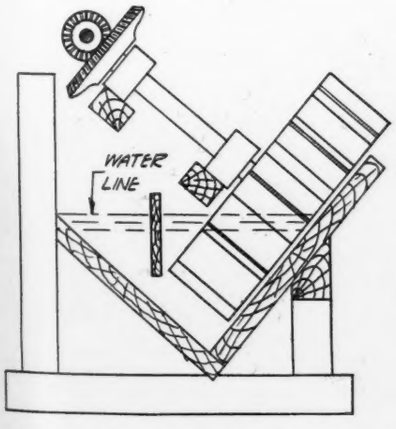
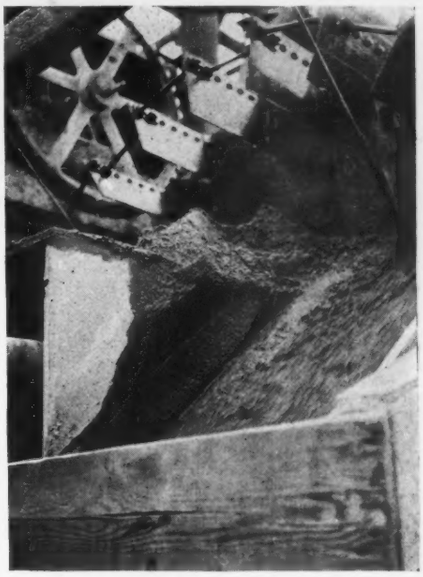


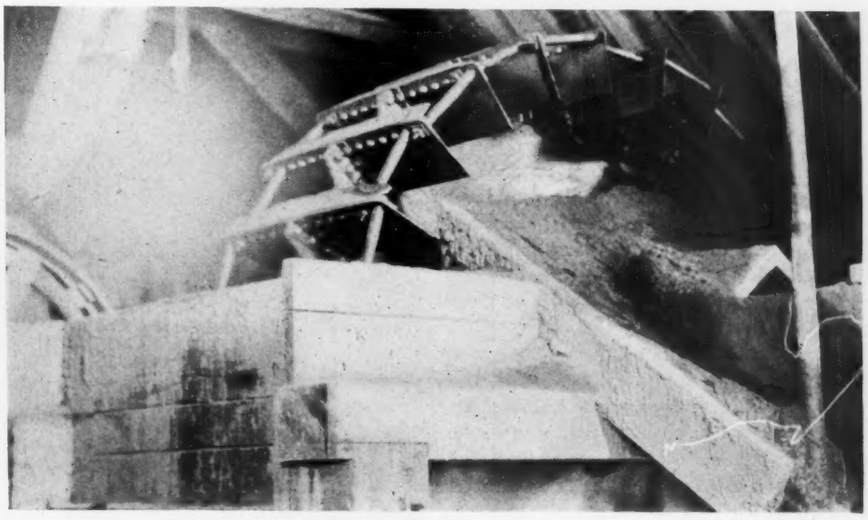

***Fig. 42. The bucket wheel, or shovel wheel, is placed on a slant***

### *The Sand Wheel and Variations of This Type*

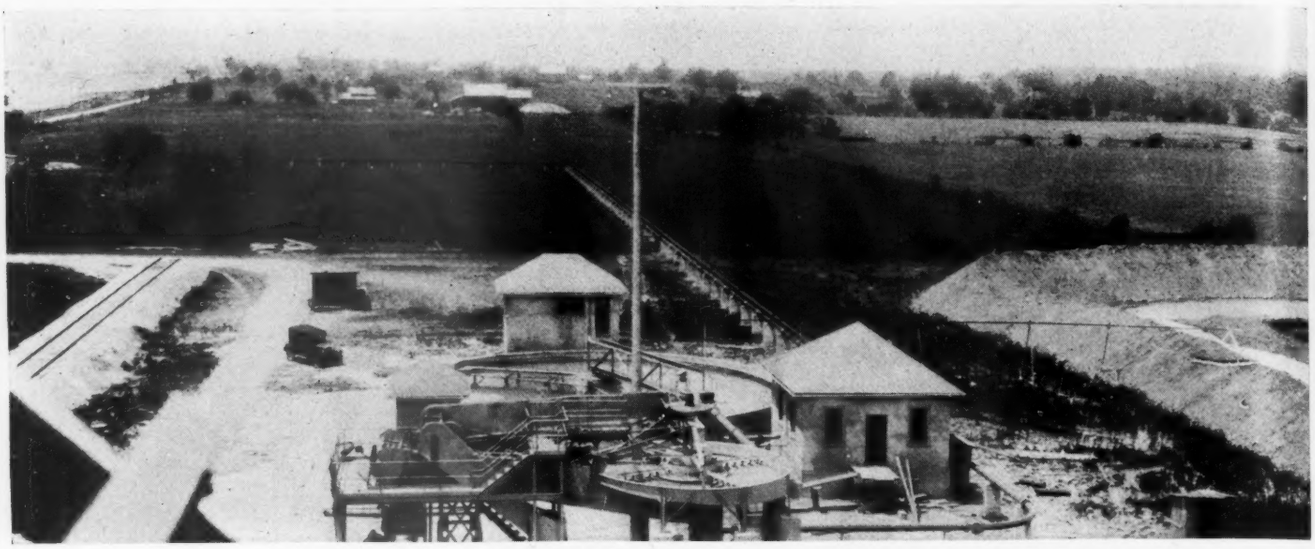
The sand wheel is one of the oldest machines for raising sand, just as it is one of the oldest forms of machines for raising water. It consists of a wheel which is usually of skeleton construction with buckets on the inside or outside that dig into the settled sand and raise it as the wheel revolves. After a bucket passes the center it spills out



***The sand wheel delivering its material to the chute***



***A sand wheel installation, showing the settling box and the chute which carries off the material***



*A very good example of a bowl classifier installation at the plant of Dolomite, Inc., Narlo, Ohio*

the sand, which falls into a trough. Some water comes up with the sand, and if this is not enough to wash it away, more water is added. The lower part of the wheel dips into a settling box of a simple type, as shown in Fig. 41.

Very large machines of this type were at one time in use, the size being sufficient to

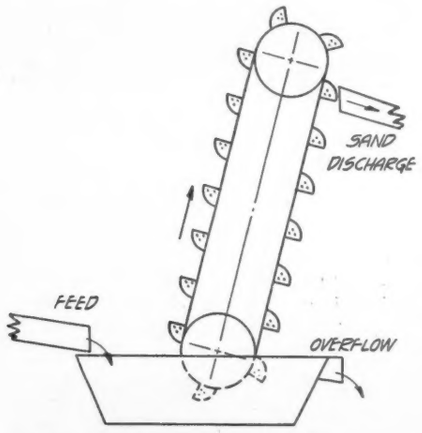


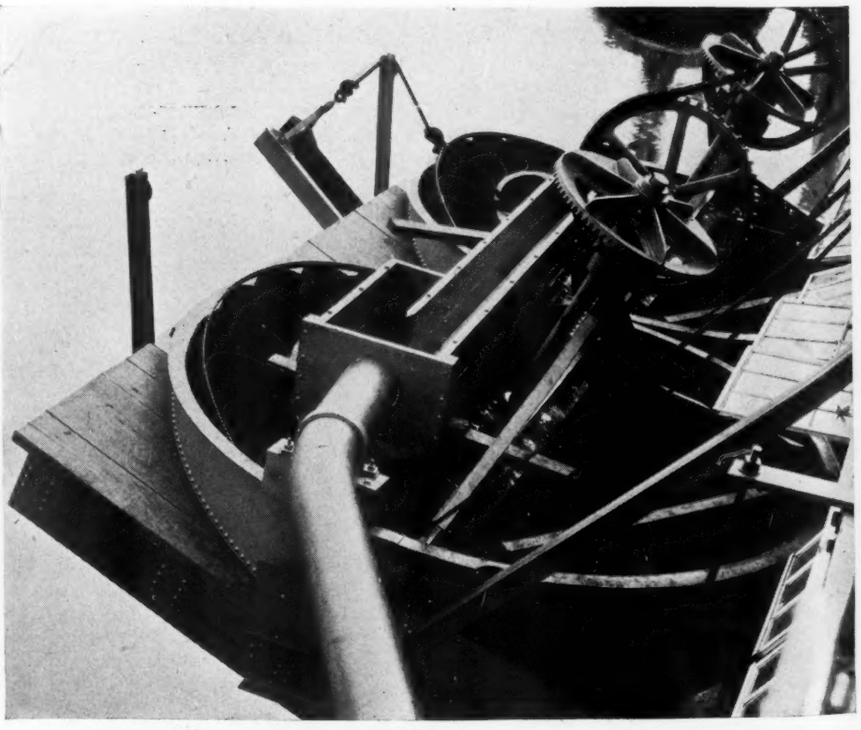

***Fig. 43. The dewatering elevator, which is sometimes used on river sand dredges***

make them serve as elevators as well as classifiers. But they were very expensive to maintain and the design of both elevators and classifiers was improved; and as the big wheels wore out they were replaced by more modern machines. Probably not one of them is running today.

But as the principle of the machine was correct, some engineers improved the design and construction, giving it the needed strength and making other changes that made it a good classifier. One of the most successful machines of this type has been designed by A. D. Hadsel, engineer of the Coast Rock and Gravel Co., San Francisco. It is working in this company's plant at Eliot, Calif., and also in the plant of the Reliance Rock Co., Azusa, Calif. (Both plants were described in ROCK PRODUCTS during 1926.)

A form of sand wheel which is free from some of the objectionable features of the tall vertical type is the flat wheel set at such an angle that the buckets will just throw the sand out of the flat tank in which it revolves. The tank is the receptacle in which the sand is settled and it is provided with an overflow on the side opposite the sand discharge. The wheel can be made much smaller for the same capacity, and the construction is stronger with this form.

This machine formerly had a somewhat limited use in ore dressing plants and in a few sand and gravel plants in the mining districts of the West. The crude form, called a "bucket wheel," is shown in Fig. 42. But it was not much known until the Dorr Co. built a machine using the same principle, which is called the Dorr sand washer. In redesigning it attention was paid to dimensions and arrangements for the feed and overflow, so that it became a classifier instead of a mere dewaterer. It has the advantage of a large capacity in a machine that occupies a comparatively small space and takes little head room. It has been used in plants washing crushed stone and sand



***The inclined bucket wheel in operation on a dredge***

and gravel, and one of the notable installations in on the dredge *Magic City* of the Meteor Transport and Trading Co., Miami, Fla.

***Dewatering Elevators***

The dewatering elevator, which is shown in diagram in Fig. 43, has been considerably used in coal washeries for recovering fine coal from overflows. In the rock products industry it has been little used. The largest application is probably with the ladder type of dredges, such as are used on the Ohio river near Pittsburgh. On these it is the usual practice to separate the sand and gravel with a revolving screen and send the products to sumps or wells in which dewatering elevators work. Fresh water is added at the gravel sump to rinse the gravel. The sand is accompanied by the water which flows with it through the screen.

The elevators on these dredges are large and heavy machines, smaller editions of the digging ladder that raises the material from the bed of the river. The same type of elevator, that is, built strong enough to dig coarse material, is using at some pumping operations, the discharge of the pump falling into a sump on the shore, from which it is excavated by the dewatering elevator and sent to the sizing screens. An excellent example of such use is found in the description of the Springfield-Pekin Gravel Co. sand and gravel plant, published in Rock Products, October 6, 1923.

These large and heavy machines hardly come within the scope of these articles, as they are so much more than sand-settling devices. But the dewatering elevator as adapted to sand settling, the writer has seen in use at one of the plants of the Greenlawn Sand and Gravel Co., Columbus, Ohio, where it was doing good work. It was a simple bucket and belt elevator and the sides of the buckets were punched with holes to allow the water to drain out. With some sands it is difficult to get a good discharge from an elevator bucket, as the sand sticks to the bottom, but there was no trouble of the kind in this case. Where such trouble does occur it may sometimes be remedied by punching holes in the bottom of the bucket.

The dewatering elevator in its simple form could hardly be used as a classifier because its action is so violent. By confining the elevator itself in baffles, the motion could be confined to a small space, but even then it would be difficult to get fine sand to settle. The place of the machine would seem to be that of a simple dewaterer for the coarser sizes of sand.

A slow-moving dewatering elevator was noted at a phosphate rock plant where it was used for dewatering fairly fine sand. Plates were used instead of buckets, and two chains of special design instead of a belt. The plates had a low capacity but gave good drainage. The machine was thrown out for another type of elevator and the dewatering accomplished in another way because of the high cost of upkeep and the low capacity.

*(To be continued.)*

## Flotation of Low-Grade Phosphate Ores

THE STUDY of the flotation of low-grade phosphate ores, now under way at the Southern Experiment Station of the United States Bureau of Mines, Department of Commerce, indicates that flotation has possibilities not only for ground material but also for unground sands minus 20-mesh in size. Though concordant results have not been obtained in all tests, the separations obtained are believed to be indicative. In several tests on unground sands recoveries of from 90 to 95% of the phosphate have been obtained with concentrates that are of commercial grade or can be made so by a single cleaning treatment. Reagent consumption has been decreased somewhat from the amounts required in the early work. No reagent combinations other than those based on oleic acid, sodium oleate or soaps containing considerable amounts of sodium oleate have been found that effect a separation between the phosphate and quartz.

## Market Preparation of Slag

THIS symposium, No. 6, is one of a collection pertaining to the characteristics and uses of blast furnace slags prepared by the National Slag Association, 937 Leader building, Cleveland, Ohio. The pamphlet of 33 pages gives abstracts of the method of producing crushed slag, granulated slag, honeycomb slag, pancake slag, sculptural slag, artificial slag and artificial pumice.

Blast furnace slag is divided into two classes as regards the mode of formation: First, slag which is brought from the molten state to solid form through cooling under atmospheric conditions and second, slag cooled by water or some other rapid cooling agency. This latter process might well be headed granulated slag.

Descriptive flow sheets are given of several plants using the pit system, the modified pits and the bank system of handling slag, with descriptions of the methods of reclaiming the cooled material, crushing, and an outline of the subsequent uses of this class of material. The plants and operations described are not confined to the United States but English and German practices are outlined as well.

## Gypsum in 1927

THE gypsum industry in 1927, though very active, was not quite so productive as in 1926, according to a statement made public by the United States Bureau of Mines, Department of Commerce, based on reports received from 60 operators in 17 states and collected in co-operation with the Geological Surveys of Iowa, Kansas, Michigan, New York, Oklahoma, Texas and Virginia.

The quantity of gypsum mined in the United States in 1927 was 5,346,888 short tons, a decrease of 288,553 tons, or 5%, compared with 1926. This production has been exceeded only in 1925 and 1926, and was about twice as large as that of 1917.

The total value of the gypsum sold or used by producers was $42,174,454, a decrease of $4,546,765, or 10%, compared with 1926. The quantity of gypsum sold by producers without calcining in 1927 was 965,371 short tons, a slight increase over 1926, and was valued at $2,388,663, or $2.47 per ton, a decrease of 14 cents per ton; the quantity of calcined gypsum sold or used by producers was 3,912,211 tons, a decrease of 103,763 tons, or 3%, and was valued at $39,785,791, or $10.17 per ton. This was a decrease of 10% in total value and 84 cents per ton compared with 1926.

New York continues to be the largest producer of gypsum. The production of crude gypsum in that state in 1927 was 1,675,501 tons, a decrease of 3% from that of 1926. This was nearly one-third of the entire quantity mined in the United States and more than twice as large as that of the second state, Iowa. New York is also the larger seller of gypsum, marketing 290,368 tons without calcining, or 30% of the United States total, and 1,291,967 tons calcined, or 33% of the total. These figures represent a decrease of 11% in the uncalcined and an increase of 4% in the calcined gypsum compared with 1926. Other important states in the production of crude gypsum in 1927 were: Iowa, 792,159 tons; Michigan, 668,617 tons; Texas, 508,382 tons; Ohio, 474,320 tons; Nevada, 327,365 tons, and Oklahoma, 271,484 tons. The first five of these states reported 77% of the total.

GYPSUM MINED AND UNCALCINED AND CALCINED GYPSUM SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1927, BY STATES

| State | No. of active plants | Total quantity mined Short tons | Sold or used by producers — Without calcining Short tons | Without calcining Value | Calcined Short tons | Calcined Value | Total value |
|---|---|---|---|---|---|---|---|
| Iowa | 7 | 792,159 | 139,637 | $ 391,701 | 584,305 | $ 6,321,796 | $ 6,713,497 |
| Kansas | 3 | 175,351 | 37,027 | 67,474 | 98,737 | 908,175 | 975,649 |
| Michigan | 6 | 668,617 | 178,378 | 331,837 | 429,639 | 3,884,687 | 4,216,524 |
| Nevada | 5 | 327,365 | 61,303 | 184,452 | 217,931 | 1,299,719 | 1,484,171 |
| New York | 11 | 1,675,501 | 290,368 | 792,410 | 1,291,967 | 14,096,980 | 14,889,390 |
| Ohio | 3 | 474,320 | 11,210 | 30,761 | 456,817 | 5,011,118 | 5,041,879 |
| Oklahoma | 4 | 271,484 | * | * | * | * | 2,073,944 |
| Texas | 4 | 508,382 | * | * | * | * | 4,003,456 |
| Other States† | 17 | 453,709 | ‡247,448 | ‡590,028 | ‡832,815 | ‡8,263,316 | 2,775,944 |
| | 60 | 5,346,888 | 965,371 | $2,388,663 | 3,912,211 | $39,785,791 | $42,174,454 |

*Included under "Other States."
†Includes Arizona, California, Colorado, Montana, New Mexico, South Dakota, Utah, Virginia and Wyoming.
‡This figure includes also sales from Oklahoma and Texas.

# Meet the General Chairman of the National Sand and Gravel Convention Committees!

## His Career Has Been Interesting

HAL G. KNIGHT, vice-president and general manager of the Rubber City Sand and Gravel Co., Akron, Ohio, whom the National Sand and Gravel Association has picked for its general chairman of convention committees, for the January convention at Cleveland, Ohio, has had a more adventurous career than the average. Mr. Knight's operation is at Krumroy, Ohio. With this explanation we reprint an article from the *Akron Beacon Journal* on the occasion of Mr. Knight's birthday:

"If the compositor should happen to set this up erroneously he would institute a gold rush to Krumroy, should he leave out the adjective "no" in the next sentence: Hal G. Knight, vice-president and general manager of the Rubber City Sand and Gravel Co. digs (by proxy) lots of sand in Krumroy, and has found no gold there.

"Before going to Krumroy he dug and washed millions of tons of sand and gravel in Alaska placer gold mining, and found fortunes in gold nuggets. Upon going to Krumroy he bored into sand banks, but not for gold. He, however, exchanges sand for gold, or silver.

"He was born in a house which stood immediately east of the old Spicer school, April 21, 1885, a son of Prof. Charles M. Knight, now retired, who was doctor of chemistry in Buchtel college. He attended Spicer school and Buchtel academy from which he was graduated in 1902. He was graduated from Buchtel college in 1906 with the bachelor of science degree.

### *Had Agricultural Ambitions*

"As a boy he had formed the notion that he wanted to be a farmer. Later on he learned about farming and concluded he did not want to be one. While in college he became interested in his studies of geology. There was a fascination connected with the study of rocks and minerals. He decided to take it up.

"Following his graduation he entered the Colorado School of Mines at Golden, Colo., from which he was graduated in 1908 with a metallurgical engineering degree. During the following year he was connected with gold, silver and other metals mining in Colorado and California, followed by nine years in gold placer mining in Alaska.

"He returned to Akron in the fall of 1918 and with his brother, M. A. Knight, organized and incorporated the Rubber City Sand and Gravel Co. This concern operates an extensive plant at Krumroy, shipping its product to the Akron and other markets. He is president of the Northeastern Ohio Sand and Gravel Association, and a director in the Akron Citizens System Co.

"He is a trustee in the First Congregational Church and a trustee of Akron University. He is a mason, Knight Templar, member of the chapter and Shrine. He is a Rotarian, member of the Akron City Club of which he is president, and where he is affectionately known as 'pilot of the cavalry.'

### *Is Champion Golfer*

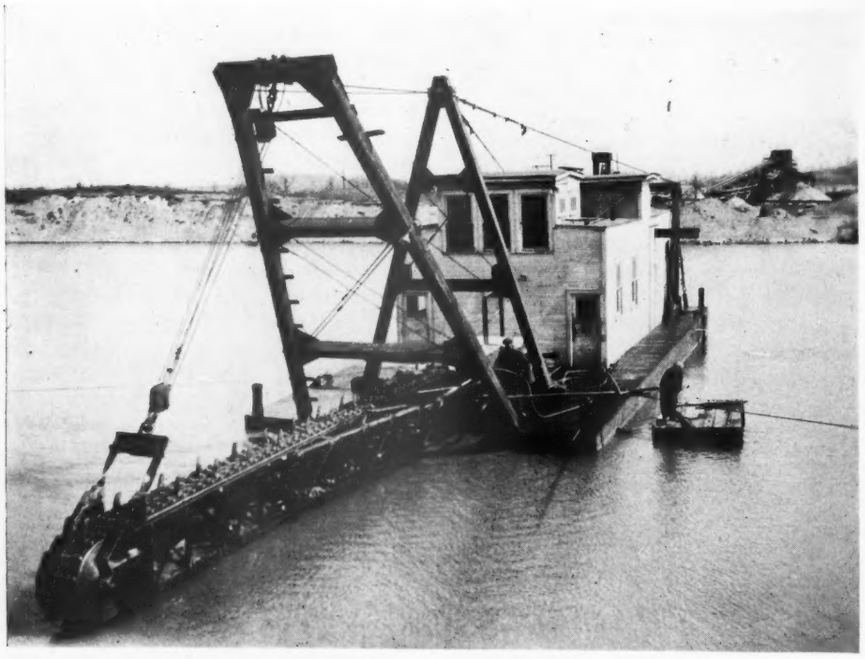
"He is a director in the chamber of commerce, member of Sigma Alpha Epsilon college fraternity, Lone Star fraternity, Summit chapter, Sons of the American Revolution, and Portage Country Club. He regrets that he is not a member of Frank J. Rockwell's West Hill Walk-to-Business Club, but it would be too far to walk to his office in East Akron and his plant in Krumroy.

***Hal G. Knight***

"He is a champion golfer and holds the championship cup offered by the City Club to its golfing members. He plays bridge and enjoys any game of cards. He is interested in college athletics and while in college was captain of the football and basketball squads. He is a football fan and attends many college games annually.

"He likes music, and while admitting he possesses talent he persistently refuses to sing. He reads current literature and technical books, is interested but not active in politics and has no political ambitions. He enjoys travel, has been all over the United States and is contemplating a visit to foreign lands. He has never attempted poetry.

"He and Mrs. Knight, who before her marriage in 1911, was Miss Mary Iredell, have one daughter."



***The new dredge of the Rubber City Sand and Gravel Co., the company of which Mr. Knight is vice-president and general manager***

## Sand and Gravel Production for the Year 1927

THE production of sand and gravel in this country in 1927 amounted to 197,454,269 short tons, valued at $115,529,786, according to the United States Bureau of Mines, Department of Commerce. This was an increase of 8% in quantity and of 4% in value as compared with the large output of 1926, and was chiefly due to the increase in paving and roadmaking sand and gravel and railroad ballast.

The sand production was 93,588,339 short tons, valued at $54,291,398; gravel production was 103,865,930 short tons, valued at $61,238,388.

New York led all the states in sand and gravel production, with 19,896,766 short tons, valued at $12,157,612. Illinois was second, its output amounting to 19,328,703 short tons, valued at $9,166,934, and Michigan was third, with 15,419,499 short tons, valued at $7,800,541.

About 76% of the total production of sand and gravel was reported as washed and screened.

SAND AND GRAVEL SOLD OR USED BY PRODUCERS IN THE UNITED STATES, 1926-1927

| | 1926 | | 1927 | |
|---|---|---|---|---|
| | Short tons | Value | Short tons | Value |
| Sand: | | | | |
| Glass | 2,274,218 | $3,615,371 | 2,171,693 | $3,257,790 |
| Molding | 5,309,166 | 5,630,799 | 4,194,975 | 4,458,508 |
| Building | 45,327,512 | 24,891,475 | 40,737,377 | 22,198,767 |
| Paving | 27,476,998 | 14,970,906 | 35,606,622 | 17,767,491 |
| Grinding and polishing | 1,859,215 | 2,504,514 | 1,686,762 | 2,193,690 |
| Fire or furnace | 434,541 | 460,967 | 410,801 | 452,835 |
| Engine | 2,355,399 | 1,440,626 | 2,618,890 | 1,640,736 |
| Filter | 79,382 | 169,299 | 74,674 | 155,137 |
| Other* | 6,997,848 | 1,992,031 | 6,086,545 | 2,166,444 |
| | 92,114,279 | $55,675,988 | 93,588,339 | $54,291,398 |
| Gravel: | | | | |
| Building | 30,535,396 | 22,701,685 | 30,432,031 | 21,947,666 |
| Paving | 38,319,064 | 25,445,025 | 44,891,975 | 29,887,365 |
| Railroad ballast† | 22,132,079 | 7,516,003 | 28,541,924 | 9,403,357 |
| | 90,986,539 | $55,662,713 | 103,865,930 | $61,238,388 |
| Grand total | 183,100,818 | $111,338,701 | 197,454,269 | $115,529,786 |

*Includes some sand used for railroad ballast and fills.
†Includes some gravel used for fills by railroads.

SAND AND GRAVEL SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1927, BY STATES

| State | Short tons | Value |
|---|---|---|
| Alabama | 2,085,696 | $1,292,233 |
| Arizona | 92,956 | 46,363 |
| Arkansas | 1,461,693 | 832,520 |
| California | 14,260,128 | 8,045,257 |
| Colorado | 622,204 | 465,818 |
| Connecticut | 667,983 | 485,169 |
| Delaware | 61,177 | 42,338 |
| District of Columbia | 990,927 | 1,048,381 |
| Florida | 1,588,907 | 930,504 |
| Georgia | 683,366 | 295,505 |
| Hawaii | 8,505 | 25,515 |
| Idaho | 198,091 | 81,238 |
| Illinois | 19,328,703 | 9,166,934 |
| Indiana | 11,870,658 | 5,552,804 |
| Iowa | 3,981,143 | 1,839,176 |
| Kansas | 2,254,648 | 1,456,130 |
| Kentucky | 3,002,311 | 1,718,055 |
| Louisiana | 2,723,112 | 1,910,064 |
| Maine | 584,395 | 251,448 |
| Maryland | 2,914,448 | 2,185,248 |
| Massachusetts | 2,646,335 | 2,495,696 |
| Michigan | 15,419,499 | 7,800,541 |
| Minnesota | 3,515,554 | 2,171,625 |
| Mississippi | 3,122,401 | 1,372,089 |
| Missouri | 4,829,473 | 2,875,530 |
| Montana | 2,187,934 | 910,513 |
| Nebraska | 2,420,364 | 1,370,605 |
| Nevada | 462,574 | 187,150 |
| New Hampshire | 863,618 | 653,214 |
| New Jersey | 4,627,159 | 3,602,289 |
| New Mexico | 360,020 | 226,990 |
| New York | 19,896,766 | 12,157,612 |
| North Carolina | 1,462,808 | 871,416 |
| North Dakota | 343,820 | 134,830 |
| Ohio | 13,187,415 | 9,085,413 |
| Oklahoma | 2,074,963 | 1,331,222 |
| Oregon | 2,415,069 | 1,438,798 |
| Pennsylvania | 13,832,181 | 12,040,406 |
| Rhode Island | 271,065 | 303,639 |
| South Carolina | 893,772 | 397,781 |
| South Dakota | 1,162,823 | 231,218 |
| Tennessee | 2,479,249 | 1,842,144 |
| Texas | 9,695,152 | 4,694,134 |
| Utah | 903,244 | 272,609 |
| Vermont | 171,250 | 39,143 |
| Virginia | 1,502,248 | 1,217,450 |
| Washington | 4,423,246 | 1,570,999 |
| West Virginia | 2,522,617 | 2,879,631 |
| Wisconsin | 9,020,124 | 3,190,334 |
| Wyoming | 1,360,475 | 494,065 |
| | 197,454,269 | $115,529,786 |

## A 750,000-Cu. Yd. Railway Ballast Order

C. E. VAN ORMAN, a contractor of Yoakum, Tex., has closed a contract with the Rock Island Railroad Co to furnish that company 750,000 cu. yd. crushed rock for ballast. The plant will be located on the Hefley land, 1½ miles southeast of Hartshorne, Okla., and will employ 30 to 50 men when running full blast. The machinery has been ordered, the surveys have been completed, the right-of-way obtained, and the plant will be ready for operation by the time the railroad company can build a side-track to the plant. Work is to start soon on both the plant and the side-track. This is the largest contract that has been consummated in this section of the country for many years. Mr. Van Orman comes well recommended by financial men of Texas and has had considerable experience in work of this kind.—*Hartshorn* (Okla.) *Oklahoman.*

## North Jersey Quarry Company Expands Its Sand and Gravel Business

THE NORTH JERSEY QUARRY CO., Morristown, N. J., has taken over the plant and property of the Lakewood Sand Co., located at South Lakewood, N. J., on the Central Railroad of New Jersey. This property consists of approximately 2000 acres of sand and gravel. It was one of the early commercial sand plants of the state, having been in operation some 18 years.

The present operation is handled entirely by steam shovel above water level, the bank being from 75 to 100 ft. in height. The shovel loads directly into a portable hopper and the material is carried by a conveyor to the screening plant, which removes the oversize and loads directly into railroad cars. The sand is of such a quality and grading that no washing is necessary. The operation is very simple, requiring only six or seven men. The capacity is almost unlimited, but the normal output runs from 30 to 40 cars per day. The overburden is removed by steam shovel and narrow-gage cars handled by a gasoline dinkey.

No gravel is being produced commercially at the present time, but the new owners contemplate the development of a 700-acre tract of gravel property. The property has been tested to 22 ft. under water level and shows a large percentage of high grade commercial gravel, and it is understood the company is contemplating the installation of a dredging plant if business warrants.

The North Jersey Quarry Co. owns and controls a chain of trap-rock crushing plants and sand and gravel operations located in northern New Jersey. Their present daily capacity is in excess of 10,000 tons, and this operation will materially increase both their output and the territory covered by their operations. The personnel of the North Jersey Quarry Co. is I. W. Wortman, president; F. W. Schmidt, Jr., vice-president, and C. W. Toye, secretary and treasurer.

## Colorado River Gravel Plant at Ballinger Texas, in Operation

ONE of the most modern gravel plants in the state of Texas is being established at Ballinger by D. H. Ryan of California and many thousand yards of gravel and sand will be screened and shipped to other points for construction work. The Santa Fe railroad has constructed tracks for the new enterprise and Mr. Ryan has installed conveyors, screening equipment, steam shovels and bins for handling the material. The plant is located on the banks of the Colorado River and thousands of yards of gravel and sand are taken from the river bed. The plant is filling a contract for 500 yd. per day for highway construction between Ballinger and San Angelo. The state receives a tax of 6 c. per cu. yd. for all gravel and sand taken from the river bed.—*San Antonio* (Tex.) *Express.*

## Kentucky Convicts to Work in State Quarries

FOR THE FIRST TIME in Kentucky history her prisoners will go to work in rock quarries, Milton Conley, Commissioner of Public Institutions states.

Twenty convicts from the reformatory here will be sent to a camp in Henry county, where they will engage in quarrying rock to be used in highway construction.

Use of the prisoners in this work was authorized by the 1926 legislature, but this marks the first step in that direction, Commissioner Conley said.—*Lexington* (Ky.) *Leader.*

# Hints and Helps for Superintendents

## Troughs for Use With Trucks on a Stockpile

AT quarries which use trucks in their operation or at other plants where trucks are used for stockpiling, it is necessary to get the trucks backed out over the top of the stockpile with the minimum of delay and inconvenience. To accomplish this, wooden troughs of 3-in. planks a foot wide and having sides about 6 in. in height can be used very satisfactorily. The troughs are made in 10-ft. sections so that they can be moved readily, and no attempt is made to fasten the end of one section to the one adjoining, as this is unnecessary. Heavy strap iron pieces bent to fit the outside of the trough and bolted in place hold the planks together. Backing out over these troughs is easily accomplished and eliminates the possibility of having the truck stuck on the top of the stockpile. The accompanying illustration was taken at the quarry of the John T. Dyer Quarry Co. at Trap Rock, Penn., where this method is successfully used.

***Wood troughs laid on top of storage piles permit the use of trucks on the piles***

## Installation and Operation of Speed Reducers

By Charles Labbe
Clarkdale, Ariz.

(From *Engineering and Mining Journal*)

PROPER design of speed reducers has been determined by the manufacturers, so that, if they are consulted on the most suitable type for the service desired, no changes should be necessary during or after installation. They are now built for every purpose of speed reduction or acceleration; but service and life depend on right selection before installation and operation. Speed reducers are simple in operation, inclosed and self-oiling, require little attention, and need to be inspected only when they become too noisy, or for repairs.

Small speed reducers and their motor drives are mounted upon baseplates. It is important to set the baseplate level; if it is a rough casting or a base built of structural iron, leveling must be done from the shaft of the reducer. After all bolts are tightened, the coupling between motor and reducer must be checked up for alignment and elevation by a machinist's scale across the top and sides of the coupling. If in its proper location, it is best to line it up from the machinery which is to be driven by the reducer, as it is obviously easier to move the reducer and motor to line than to change heavier machinery. Overhead, if possible, permanent eyebolts or an I-beam should be provided to accommodate chain blocks. Large reducers, if they are set on a bedplate, are installed in the same way as small ones, but the bedplate must be supported on the foundation by shims placed at least every foot, as the weight of the speed reducer and of the motor will bend the bedplate at the center if unsupported and will make difficult the lining up of the coupling. Machinery must be bolted tightly and exactly in place before grouting.

Couplings of small size or of light duty, having flexible material, are lined up with a scale; but heavy-duty, all-metal couplings require more care. The motor and reducer are first leveled and lined by their shafts' centers in relation to the center line of the machine; this is done by stretching a fine wire, from which a plumb line is hung for each shaft center. The finishing at the coupling is accomplished by the use of thickness feelers between the faces. All the bearing caps must be drawn tight, leaving the shaft in its running fit, and all foundation bolts must be tightened evenly when lining up is finished. The lateral play in a motor must be taken into consideration, and the extreme play toward the coupling must have a clearance to avoid pounding. In lining up from herringbone gears, the largest gear shaft must have minimum lateral play, and the pinion shaft must be free to adjust itself in line while running.

On the proper lubricant for a speed reducer depend its service and wear. Hard greases are not recommended, but some automobile greases, such as are used in differentials and gear cases, give good service. The lubricant must be light enough to cover gears and shafts, must cling to the metal, must not be thrown off by centrifugal force, and must adhere to the metal surfaces under the pressure. Lubricants must not be hard or "heavy," so as to congeal in cold weather and thus make the reducer hard to start and to run. Many suitable lubricants are available, it being necessary to consider temperature range and speed. Each machine shipped is either provided with a tag or has marked on a plate the brand or kind of lubricant recommended as most suitable.

Oil level, high and low, is ascertained and marked; as a general rule the lowest gear dips about one inch in oil. Two nipples, elbow and cap, make a good oil gage, but the top of the nipple must be the highest level; otherwise, the excess of oil will overflow. Too much oil in some reducers causes heating, which is detrimental to the lubricant and may cause the operator to suspect mechanical trouble. Glass oil gages are not common, as they are likely to break and thus let most of the oil run out; furthermore, they are useless for heavy oils. Two pet cocks are better than two plugs, as it is easier to ascertain the oil level at any time. After filling the case with the lubricant until it overflows at the high level mark, it is necessary to be sure that all parts are lubricated before starting.

After a speed reducer has been installed it is advisable to run it without load for a reasonable time to ascertain that it is working freely, that no part is heating or binding, and that the oil circulates properly and reaches every part to be lubricated. The nuts holding the packing gland should be tightened with the fingers only, so as not to press the packing against the shaft too much and cause it to heat and cut as the shaft revolves. If a little oil leaks through, the gland can be tightened further.

After an hour or so of running, the reducer will be uniformly heated. If the heating is local, such as a shaft, bushing, or stud, it is advisable, if the part is within easy reach, to take it apart and to scrape and polish the high spots. But should the heated part be inside, it is safer to run the machine without load until the part is warm, and then

to shut down and let it cool and start again. Some shafts, after running warm the first twenty minutes, when stopped and cooled and started again may not heat for an hour; after again stopping and cooling they may take a still longer time in which to heat again. This is proof that a high spot is wearing down to place. Such a condition improves after "running in." If the condition grows worse, the reducer must be taken apart and an investigation made as to the cause.

If there is trouble, several things can be tested; oil holes should be drilled through where intended; oil grooves must connect to oil holes or oil chambers; hard grease may have been used and the oil passages may have become choked; and grease, when trapped and heated, sometimes forms a hard substance that must be scraped off. New machines are sometimes fitted too tightly all over and require much preliminary running before being placed in service. Part of the frame or case may have been tightened too much, causing distortion, which may be remedied by slightly loosening the bolts of the case or the capscrews holding the flanges or bushings. The heating of a shaft may also cause a thrust bearing collar to heat; error in the setting of a coupling may be the cause.

The oil level should be watched so as to prevent it from dropping below the safety point. If there is no air vent, the top filling plug, or inspection plate, is left open, as the heat generated will cause a slight pressure, which will force some oil out at the shaft packing or at any bearing. Heavy oils used in speed reducers maintain their consistency up to a temperature of from 120 to 140 deg. F., beyond which they may lose much of their efficiency. After the first week's run, oil should be drained out and renewed. It may be advisable also to wash out the case with kerosene before refilling. A sediment chamber should be provided with a plug at the lowest point of the base.

Repair parts are seldom kept on hand for speed reducers, as the part that may require renewal is uncertain; it may be a shaft near the shoulder of a gear or a stud holding an intermediate gear; teeth may break; capscrews may shear or twist off; a cover or flange may be sprung or broken; or the frame may break. This is the work of the repair mechanic in a machine shop where the broken pieces can be welded or even a new piece made, if necessary.

If a speed reducer has not been installed properly, or if there is a defect in construction, a noise will soon develop. The high-speed reducers, 3000 to 5000 r.p.m., sometimes develop noisy couplings. The cause may be lack of proper lubrication, too narrow bearing faces for the load, insufficient lateral motion, or shafts out of line. A flexible coupling for high speed and heavy duty must be lined correctly, as the flexible feature provides for the difference in bearing wear, heat distortion, and misalignment of only a few thousandths of an inch; otherwise they will be noisy and will not last. Couplings for medium speed, 1000 to 2000 r.p.m., are usually equipped with studs and rubber bushings and give good service; slow-speed reducers, metal to metal, often live through any condition without requiring that any particular attention be given them.

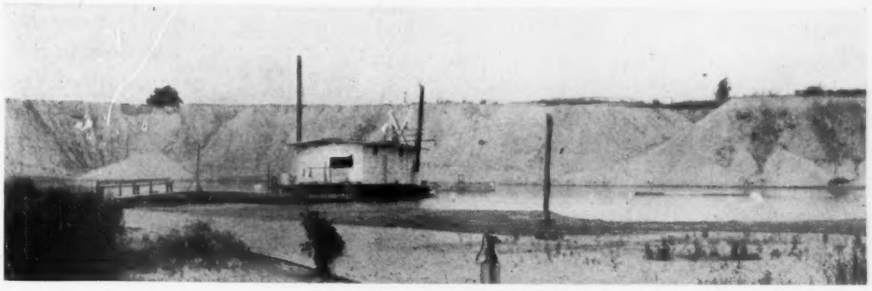
Gears, machined and finished all over, have no chance of being out of balance, but with service the usual wear takes place. Worn studs and bushings must be replaced by new ones; expensive shafts have their journals trued on the lathe, but for smaller parts it is best to keep them to standard sizes. Few gears or pinions can be re-trued on a lathe, because they are worn usually to the safe limit; especially cast-iron gears, where the new tooth face may not mesh properly with one of the old or worn shape, thus causing the breaking of teeth. If gears are intended to be turned over for addition wear, they must be designed with a wide tooth base. Many of the larger worms can be turned over for new wear: small ones are pressed off the shaft and turned over; large ones held by bolts or capscrews are removed and also turned over, the holes corresponding and the bolts fitting snugly.

Thrust bearings and ball bearings should be inspected for wear and dents. If not badly damaged they can be trued up on a lathe in the following way: The ball race is held in a chuck, and a copper washer, shaped to correspond to the ball race, is mounted on a mandrel. While the ball race is revolving, the copper disk is smeared with emery and kerosene and pressed against the hardened ball race. No chances should be taken with damaged rollers or cones; they may ruin a whole bearing and shaft in a short time. Large shafts can be inspected for defects or cracks, as is done for large engine parts. The shaft is wiped clean, washed with gasoline, and wiped dry. It is painted with whitewash (made of lime or chalk) and left to dry. Any crack will then show up as a dark yellow streak.

It is necessary to renew all the bearings of herringbone gear shafts with the same material, so that they will wear alike. In rebabbitting bearings, the anchoring should be ample, so that the babbitt will not get loose. Dovetailed grooves should be cut or holes drilled either radially through the sides or endwise, parallel with the shell, breaking out the inner wall. In renewed bearings, if possible, two sets of oil holes and grooves should be provided, as little additional time is required and lubricating conditions are improved.

## Former Gravel Dredging Pond Used as Swimming Pool

THE gravel pit of the Northern Illinois Supply Co. at Rockford, Ill., was formerly worked as a dredging operation. About two years ago it was decided to abandon this means of operation and substitute shovel excavation. The dredging pond and the dredge boat remained, and the officials of the company decided to open up the pit as a swimming pool for the people of Rockford, charging a nominal fee for the use of the pond. So the dredge boat was converted into a bath house with lockers and a place for storing swimming suits, and then anchored in a permanent position at one edge of the pond. An attendant was placed in charge for the whole summer season.



***Old dredge boat in the pit of the Northern Illinois Supply Co., Rockford, Ill., which is now used as a bathhouse***

## Chain Drags

IN CALCINING gypsum plaster in the usual kettle type equipment it is necessary to have the rabble arms in the kettle not only help stir the mass but scour the bottom of the kettle as well. It is the usual practice to clamp ordinary ⅝-in. chains to the arms for this purpose.

It was found in practice that these chains wore out in a few months time and the worn links would break off the chains and become mixed with the plaster causing endless troubles in the subsequent operations. Owing to the nature of the operation it is practically impossible to examine these chains without delaying production. To overcome this trouble at a western gypsum plant, egg shaped, cast-iron balls were cast with a ½ in. hole through the long axis, and enough of these "eggs" were strung on a ⅜-in. cable to make up the drag. The castings were about 2½ in. long by 1¾ in. thick. It was found that these eggs rolled rather than slid over the bottom of the kettle and lasted five to six times as long as the previous drags. Also they were cheaper in first cost and just as satisfactory in operation.

# Editorial Comment

**Law of Supply and Demand**

It is noteworthy that both candidates for the office of President of the United States, in their most important public utterances to date, have laid stress upon maintaining the American heritage of equal opportunity; and in the same announcement have refused to bid for the votes of the radical farm element by a promise to espouse government price-fixing. Price-fixing by or with the authority of the government is a tremendous blow against equality of opportunity, which has distinguished our industrial and social development from their beginnings. Also price-fixing is an attempt to circumvent the inexorable law of supply and demand. As men of common sense and seasoned experience, and honesty, they see the conflict.

Owing to a genuine or an alleged overcapacity in practically all branches of industry, at the present moment, all business men should face the issue with equal honesty and frankness. They should take and probably do take an extraordinary interest in all attempts to solve this problem of agriculture; because whatever the attempted solution may be, the government very logically may be later called upon to apply it to some other industry. For while the farmer is a sufferer today, and has been more or less a chronic sufferer always, there are plenty of other industries that time and again have found difficulties in adjusting themselves to the law of supply and demand.

The real kernel of the problem, all technical details aside, is: Have we outgrown our American traditions that competition is the life of trade, and that the door of opportunity shall be kept open to all who have the ability and the "intestinal stamina" to make the attempt to succeed in any industry or profession they themselves may select?

**The European Cartel**

Abroad, where there are no such traditions to uphold, where governments are looked to for the solution of all economic problems—even by such methods as the recent world war—they have what are known as "cartels." The cartel came into existence in Europe long before the world war, primarily to solve this problem of overproduction, or overcapacity, and resulting price cutting by producers. In the words of a member of the staff of *Commerce Reports,* the official journal of the Bureau of Foreign and Domestic Commerce, the cartel is the attempt of the best business brains in Europe "to enable modern industry to adjust its production to demand and to substitute market control for the intimate familiarity with the market capacity enjoyed by the individualistic producer during the early phases of industrial development. The cartel also marks a certain stage in economic psychology when producers begin to realize the futility and wastefulness of cut-throat competition and when the corporate form of business, involving responsibility to numerous stockholders, interferes with the full application of the law of the survival of the fittest."

Cartels, of course, are forbidden by the Sherman anti-trust law in the United States. There is a considerable movement to repeal or revise the Sherman law to permit something like them. Sooner or later every business man must face the issue: Either, like the present group of radical farmers, he must seek a government guarantee of profits, or continue to play the game as he has, with perhaps less ruthlessness, but nevertheless allowing "the devil to take the hindmost."

Up to the present time, at least, foreign cartels have not been successes, with very few exceptions. *Iron Age* in a recent editorial said:

**Cartels Not the Answer**

> The cartel or convention is usually an exhibition of producers' despair, and for the long run nothing to occasion worry in the minds of consumers. It results from the development of excessive capacity for production and violent competition to make use of maximum capacity, with the consequent trimming of prices. The inspiration of the cartel is therefore fear and its purpose is to prevent prices from going lower rather than to raise them.
>
> It has been the general experience of the world that attempts to elevate prices for the benefit of producers are doomed to early failure. Thus, the Secretan corner in copper, the later adventure of the Amalgamated Copper Co., the Brazilian coffee valorization, and most recently the British rubber restriction. Almost all artificial manipulations in that direction at once invite outside competition. The only safety is in the possession of natural monopolies, or with conditions so concentrated that agreements may be arranged and be kept among a few persons. Of this last the production of diamonds is a good example. There are not many commodities in respect to which conditions can be worked out so fortunately for the producers.

With raw material resources so plentiful as in the rock products industry we are inclined to believe producers must seek another remedy. The only other remedy, short of actual government licensing of new enterprises (which apparently nobody wants), is the exercise of more intelligence and more practice of ethics by the producers themselves. It is unfortunate then that some of the fundamentals of business economics, like the law of supply and demand, are being obscured by half-baked theories, widely circulated.

**Obscuring the Issue**

For example, a learned gentleman has written a thesis on: "Unlocking the Potential Buyers' Market—How Prosperity May Be Continued Through Higher Adult Education Among Producers and Consumers to Open Outlets for Industry's Overcapacity." So far so good; for the only solution to any

of our perplexing problems of government and industry lies in a better understanding of them, and this, of course, can be obtained only by some sort of education. But higher education should not befuddle our minds to underlying fundamentals.

In the first place it is erroneous to pretend that a 'buyers' market" is anything but a natural condition of any market. Except for freak periods, all markets are buyers' markets. The wants and requirements of primitive man are few and easily satisfied; and various catastrophies have proved over and over again that modern man can readily adjust himself, temporarily at least, to a return of primitive living conditions. To sell him anything over and above the bare necessities of primitive life has required sales effort on the part of producers of a commodity; and where sales effort has been required we have not had a "sellers' market," in the true sense of the word.

Moreover, the ability to produce a surplus was the first step mankind made toward our present civilization. If our requirements had always remained exactly gaged to the supply, it is reasonably doubtful if we would have progressed beyond a primitive stage.

Notwithstanding the fact, that to most business men a buyers' market is the natural condition of things, our economist friend advances three or more reasons why the "present buyers' market is permanent":

1—"The rate of growth of population is diminishing in the United States. This makes for buyer initiative for there are fewer people to buy the product.

2—"The rate of growth of men and women educated in the high schools is rapidly advancing. This makes for buyer initiative for the intelligent and understanding buyer refuses to accept a condition thrust upon him by a seller.

3—"The bases of growth of material wealth are rapidly advancing. No limit has been found to the productive capacities of the United States under modern methods of production. This makes for buyer initiative, as it presents the buyer with quantities of goods not only sufficient for his needs, but constantly advancing into the field of his wants."

His first proposition is equivalent to saying that our rate of progress toward old age and the grave diminishes as we grow older. At the age of 10 years our rate of advance toward maturity is 10%; at 100 years it is 1%. If the population of the United States increases 1,000,000 a year, the rate of growth in population is naturally less when our population is 120,000,000, than it was when the population was 80,000,000. We must still provide each year for the wants of the additional million.

Regarding the second and third propositions we do not recall that the time ever existed in any industry, for any length of time, when "an understanding buyer accepted a condition thrust upon him by a seller." It has always been the sellers' function to cater to the understanding, as well as the whims and fads of his customers. Can anyone quote an instance to the contrary in any American industry?

What progressive American business men have always done, and the most they can hope to do now, is to strive to keep some advantage to themselves in a perpetual buyers' market. They do it by co-operation with fellow producers in the same industry *to create* a larger demand and by trying to gage their increases in productive facilities to anticipated increases in demand. The portland cement industry was remarkably successful in both ways for a considerable period of time; but we do not believe that there ever was more than a brief period in the portland cement industry, or any other, when all the manufacturer had to do was to sit back and accept orders and apportion his entire capacity to eagerly waiting buyers. He had to work hard, individually and collectively, to make these buyers—which he did, it is true, with very remarkable success.

No wise and shrewd portland cement manufacturer—no cement manufacturer so far as we know—ever thought it desirable to give up his brand name, or to cease individual sales efforts, even in this, which has been called a "sellers' market." And even in that so-called sellers' market, it was the understanding engineer buyer who established and demanded the quality specification; but not until at least a few progressive and enterprising manufacturers had proved that they had already produced a product to meet it.

A standard specification adopted, did *all* portland cement manufacturers at once consider it a maximum specification, not to be exceeded? They did not; those who made better than standard cement were never very reticent about saying so, or our memory is faulty. The present development of special cements, quick-hardening, etc., is only the natural outgrowth of this competition, and the best proof possible there always has been genuine competition; it is not a condition suddenly forced upon manufacturers through buyer initiative, as some of our amateur economists would have us believe.

There are only three bases for real competition—price, quality and service. Fortunately there is a very influential group of producers in nearly all industries which believes in quality and service competition, otherwise there would be no alternative but cartels or direct government supervision of industry to save it from utter disaster.

**Quality Competition**

The buyer of cement, in the main, always has been an "understanding buyer," in fact he has generally known more about the product than its manufacturers; consequently he has always been susceptible to quality sales arguments. The same applies to the buyers of other rock products. There is nothing new in this phase of the problem.

Two factors have largely controlled the construction of new plants: (1) A belief in a constantly growing demand; (2) a conviction that new and more efficient plants could make a better and cheaper product. There probably never has been a time in recent years in any industry when there was not "overcapacity" if every and all plants of every degree of

**Limiting Productive Capacity**

(*Continued on next page*)

efficiency were counted at the rated capacity given by their owners. The very salvation of American industry has been a constant and perpetual striving by both old and new producers to make a better and a cheaper product. To scrap an old operation because of the inefficiency either of equipment or management is no more an economic crime than to scrap obsolete machinery for up-to-date machinery. Are conditions today so strikingly different that this policy must be changed?

We don't believe that there is any sizeable group of American business men which believes, or can be persuaded to believe, that the fundamental laws of supply and demand, and the survival of the fittest, can be changed by mutual agreement or by legislation. As overcapacity overtakes any industry and prices and return on capital diminishes the trying situation inevitably rights itself, because money for new plants can not be secured. There is bound to be a certain amount of hardship in the readjustment, but does anyone want to eliminate all hardship from life or industry—and the character-building that goes with hardship?

To most American business men, business is more than a means of livelihood. It is a great and absorbing game that puts a premium on courage, resourcefulness, foresight and good judgment. The most that virile American business men ask is that the game be played fairly and ethically. They are not afraid to be tried by the law of supply and demand and that of the survival of the fittest. That is merely the working out of our American heritage of equality of opportunity.

**A Succinct Summary**

Reading the transactions of a convention of one of the oldest associations in the rock products industry—an industry that has been a chronic sufferer from overcapacity and "buyers' markets" we came on the following, which summarizes with admirable style and conciseness this "new" situation which is now reputed to be confronting all our industries:

"We cannot get around that inexorable law of supply and demand. We may combine or we may legislate; we may do all in our power, but we still run up against that law. We all run up against that and stop. I think the right thing to do is to make the most of the very best material we can produce and at the least possible price; reduce the cost of production all we can. Make the article as attractive as we can to our customers. This will eventually increase the demand and find us new customers. If we do that, we will have good times and bad times, but we will get over the bad times better than by putting up our prices. Law is law."

Strange to say, the industry to which these remarks were addressed has spent twenty years since then mainly trying to put up the prices of the commodity; and that industry is farther in the dumps today than it ever was, in spite of a few brief periods of comparative prosperity—which we think is ever the case of those who would attempt to make themselves or their business exempt from the laws of nature.

## Thermal Expansion and Spalling Characteristics of Fire Brick

THE most recent reference to the study of the fundamental qualities of representative fire-clay refractories and individual clays appeared in *Technical News Bulletin* of the U. S. Bureau of Standards, No. 132 (April, 1928).

Bricks have been made in the laboratory, from prepared batch materials furnished by 14 manufacturers of refractories, by each of three methods most commonly employed in the manufacture of fire brick; namely, dry press, stiff mud extruded (end out), and hand made. These bricks were burned at 1,400 deg. C. (cone 14) for five hours, and five of each type were subjected to the standard test for resistance to spalling as described in Bureau of Standards Circular No. 299, United States Government master specification for fire-clay brick. This test specifies that the end face of the brick heated to 850 deg. C. be immersed to a depth of 4 in. in running water at hourly intervals.

The results of the quenching test from a total of 42 sets of fire bricks, show (1) the number of quenchings to cause failure to range from 1 to 30; (2) those bricks, with one exception, whose alumina content is over 40%, have considerably greater resistance to spalling than those whose alumina content is less than 40%; (3) although some sets show little difference in spalling resistance between the bricks prepared by the different methods, others show almost 100% difference.

Information has been furnished by the manufacturers as to their methods of making brick. The data thus obtained have been compared with that resulting from the bureau's brick-making experiments. This comparison shows that only six of the manufacturers are using methods which produce, from their particular raw batch, bricks having the greatest resistance to spalling.

The linear thermal expansion observations, which were made on 1 by 1 by 6 in. specimens of these bricks, gave the following information:

1. No relation is apparent between method of preparation of bricks and the thermal expansion.

2. In only one instance were the expansion measurements the same regardless of the method of making the bricks.

3. A direct relation was found between expansion and resistance to spalling in 7 out of the 14 sets observed for expansion; in 6 sets, 2 out of 3 show this relation; and in one case no relation was found, the results being identical for the 3 types of bricks.

4. The greatest difference in expansion between the bricks prepared by the three methods in any one set occurred in those of high silica content and amounted to approximately 10%. The dry press had the highest expansion and the stiff mud the lowest.—*Technical News Bulletin* of the U. S. Bureau of Standards.

## Three Forks-Yellowstone Region Phosphate Deposits

THE region described in Bulletin 795-G of the U. S. Geological Survey is about 7000 miles in area, a considerable part of which is underlain by a bed in the Phosphoria formation, of Permian age. It was with the object of ascertaining the extent and value of the phosphate beds in this area that the field work summarized in this report, "Phosphate Rock in the Three Forks—Yellowstone Park Region, Montana," was undertaken.

A review of the Rocky mountain fields with an economic geological map of the field and columnar sections of the phosphate beds of the Three Forks region is included in the report. The various districts of the region are individually treated in detail with respect to their geology. The occurrence origin, mineral and chemical composition of the phosphate beds is carefully discussed.

A summary of the principal reports describing the western phosphate fields are listed in the bulletin together with a summary of some of the more interesting features described. The report contains 209 pages and may be obtained from the U. S. Geological Survey at Washington, D. C.

## W. F. Wise Expands His Interests in Southwest Quarry Industry

THE SOUTHWEST STONE CO. has been incorporated by W. F. Wise, San Antonio, Tex., and his partner, H. C. Perry, to take over the plant and quarries of the Chico Stone Products Co. of Chico and Dallas, Tex., formerly owned and managed by E. C. Dodson. The Chico Stone Products Co. recently went through bankruptcy.

W. F. Wise and H. C. Perry are the owners and managers of the Stringtown Crushed Stone Co., Stringtown and McAlester, Okla., and the Texas Trap Rock Corp., Knippa and San Antonio, Tex. Mr. Wise is one of the five regional vice-presidents of the National Crushed Stone Association, the president of the Southwest Division of the National Association, and is well-known throughout the quarry industry as "a live wire."

## Batesville (Ark.) Gravel Co. Moves Operations

THE BATESVILLE GRAVEL CO. that has operated at Seobey, Miss., for the past several months will move to Pope, where operations will begin. The pit, where the Batesville Gravel Co. has operated on the Harrison farm, is said to have shipped about 1500 carloads of gravel.—*Cleveland* (Miss.) *Commercial.*

## New Rock Asphalt Project in Kentucky

DEVELOPMENT of 7500 acres of rich rock deposits in Grayson county, four miles southeast of Leitchfield, Ky., by eastern and foreign capitalists has begun.

Erection of a crushing and refining plant that will cost approximately $2,000,000 is on the program of the owners of this property. The plant may be built at Owensboro. The chief product of the manufacturing plant will be German motor dyes, manufactured under patents held only by citizens of the German nation; essential oil, used in the manufacture of high-class perfume, and spindle oils.—*New York* (N. Y.) *World.*

***New all-steel 4 1/2-yd. rock cars at the crushing plant of the Ohio Blue Limestone Co., Marion, Ohio***

## Some Improvements at the Ohio Blue Limestone Co. Plant

By W. E. Edwards

A GOOD EXAMPLE of the constant striving for better and more efficient equipment in the crushed-stone quarry industry is illustrated by the case of the Ohio Blue Limestone Co., Marion, Ohio. Just a year ago (August 20, 1927) ROCK PRODUCTS contained a description of the company's remodeled and improved plant; but changes and improvements did not stop then. They have been kept up to date.

Two veteran quarry locomotives have been retired in favor of two new 8-ton Plymouth gasoline locomotives. The old 4½-cu. yd. contractor-type, wood quarry cars have been replaced with new all-steel, Atlas 4½-cu. yd. cars. These changes bring the quarry equipment to a par with new crushing plant equipment described in the previous article.

However, even in the plant some notable improvements have been made in the first year of its operation. The revolving, home-made grizzly described in the August 20, 1927, article, has been replaced by a 4x6-ft. Niagara vibrating-screen grizzly, belt-driven by a 5-hp. General Electric motor. Oversize is now reduced in a new Symons cone crusher, replacing an old No. 5 gyratory. A new 100-hp. General Electric motor drives the Symons crusher.

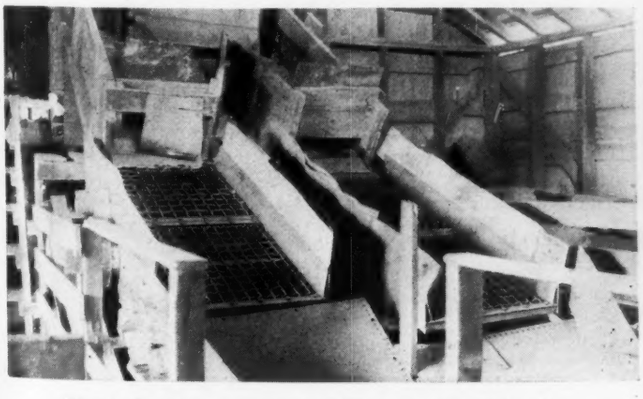
Four new Niagara vibrating screens do the sizing of the finished product, replacing two 48-in. by 24-ft., double-jacketed, revolving screens. The new vibrating screens are 3x6 ft., but two of them are double-decked.

A new blacksmith and machine shop, equipped with an 18-in. lathe, a power hack saw, drill press, grindstones and emery wheels, a 9x12-in. Bury air compressor, forge equipment and fans is also among the new improvements.

The officers of the Ohio Blue Limestone Co. are: President, W. J. Glenn; vice-president, L. M. Sager; secretary-treasurer and general manager, E. G. Holzhauer.

## National and Southern Builders Supply Associations to Meet at Memphis

THE Memphis Chamber of Commerce has announced that the National Builders Supply Association and the Southern Builders Supply Association will hold their annual conventions at Memphis in December of this year. A big attendance is expected at the conventions and members will have an opportunity to see the industrial developments of that section. The southern association has always enjoyed excellent attendance.



***New vibrating screens installed at the Ohio Blue Limestone Co. plant***

***Double-deck vibrating screen recently installed in the plant of the Ohio Blue Limestone Co.***

# Financial News and Comment

## RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

| Stock | Date | Bid | Asked | Dividend |
|---|---|---|---|---|
| Allentown P. C. com.[37] | 12-30-27 | 3 | 7 | |
| Allentown P. C. 1st 6's[37] | 12- 5-27 | 90 | 92 | |
| Alpha P. C. new com. | 9-10-28 | 44 | 46 | 75c qu. July 14 |
| Alpha P. C. pfd.[2] | 9-10-28 | 117 | ..... | |
| Amer. Aggregate 6's, bonds | 9-12-28 | 104¼ | 107 | |
| Am. L. & S. 1st 7's[32] | 2-24-28 | 101¾ | 102½ | |
| American Silica Corp. 6½'s | 9-12-28 | 96 | 100 | |
| Arundel Corp. new com. | 9-11-28 | 40 | 40 | 50c qu. July 2 |
| Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10] | 7-18-28 | 103 | 109 | |
| Atlas P. C. com. | 9-10-28 | 39 | 41 | 50c qu. Sept. 1 |
| Atlas P. C. pfd. | 9-10-28 | 47 | 49 | 66⅔c qu. July 2 |
| Beaver P. C. 1st 7's[30] | 9- 5-28 | 97½ | 100 | |
| Bessemer L. & C. Class A[4] | 9- 7-28 | 34¾ | 36 | 75c qu. Aug. 1 |
| Bessemer L. & C. 1st 6½'s[4] | 9- 7-28 | 100 | 100¾ | |
| Boston S. & G. com.[18] | 9- 7-28 | 76 | 80 | $1 qu. July 2 |
| Boston S. & G. 7% pfd.[18] | 9- 7-28 | 82 | 85 | 1¾% qu. July 2 |
| Boston S. & G. Co. 1st pfd.[16] | 9- 7-28 | 93 | 95 | 2% qu. July 2 |
| Canada Cem. com.[48] | 9-11-28 | 27¼ | 28 | |
| Canada Cement pfd.[43] | 9-11-28 | 98½ | 99 | 1.62½c qu. Sept 30 |
| Canada Cement 5½'s[43] | 9- 7-28 | 101¾ | ..... | |
| Canada Cr. St. Corp. 1st 6½'s | 9-10-28 | 95 | 99 | |
| Canada Gyp. & Alabastine | 9-11-28 | 66 | ..... | |
| Certainteed Prod. com. | 9-11-28 | 45¾ | 46 | $1 qu. Oct. 1 |
| Certainteed Prod. pfd. | 9-10-28 | 94½ | 96½ | $1.75 qu. Oct. 1 |
| Cleveland Stone new st'k | 9-11-28 | 50 | 60 | 50c qu. Sept. 1 & 25c ex. |
| Consol. Cement 1st 6½'s, A[42] | 9-12-28 | 94 | 99 | |
| Consol. Cement 6½ notes[24] | 9-12-28 | 92 | 96 | |
| Consol. Cement pfd.[41] | 9-12-28 | 40 | 60 | |
| Consol. S. & G. com. (Canada) | 9-10-28 | 13 | ..... | |
| Consol. S. & G. pfd. (Canada) | 9-10-28 | 84 | 85 | |
| Consumers Rock & Gravel, 1st Mtg. 6's, 1948 | 9- 5-28 | 97½ | 99½ | |
| Coosa P. C. 1st 6's[22] | 12-28-27 | 65 | 75 | |
| Coplay Cem. Mfg. 1st 6's[40] | 9-10-28 | 90 | ..... | |
| Coplay Cem. Mfg. com.[40] | 9-10-28 | 12½ | ..... | |
| Coplay Cem. Mfg. pfd.[40] | 9-10-28 | 72½ | ..... | |
| Dewey P. C. 6's[30a] | 9-12-28 | 99 | 101 | |
| Dolese & Shepard[7] | 9-12-28 | 146 | 150 | $2 qu. Oct. 1 $1 ex. Oct. 1 |
| Edison P. C. com.[19] | 9- 7-28 | 10c | ..... | |
| Edison P. C. pfd.[19] | 9- 7-28 | 50c | ..... | |
| Edison P. C. bonds[19] | 9- 7-28 | 75 | ..... | |
| Fredonia P. C. 1st 6½'s[22] | 12-28-27 | 97 | 101 | |
| Giant P. C. com.[25] | 9- 7-28 | 25 | 30 | |
| Giant P. C. pfd.[25] | 9- 7-28 | 31 | 37 | 3½% June 15 |
| Ideal Cement, new com. | 9-11-28 | 72 | 74 | $1 qu. July 1 |
| Ideal Cement 5's, 1943 | 9- 8-28 | 101 | 103 | |
| Indiana Limestone 6's | 9-11-28 | 91 | 91½ | |
| International Cem. com. | 9-11-28 | 67½ | 67¾ | $1 qu. Sept. 28 |
| International Cem. bonds 5's | 9-11-28 | 96½ | 96⅝ | Semi-ann. int. payable June 15 |
| Iron City S. & G. bonds 6's[46] | 9-10-28 | 98 | 98½ | |
| Kelley Is. L. & T. new st'k | 9-11-28 | 53 | 54 | 62½c qu. July 2 |
| Ky. Cons. Stone Co. com.[48] | 9- 6-28 | 13 | 15 | |
| Ky. Cons. St. com. Voting Trust Certif.[48] | 9- 6-28 | 12½ | 14 | |
| Ky. Cons. Stone 6½'s[48] | 9- 6-28 | 97 | 100 | |
| Ky. Cons. St. Trustee Certif.[48] (1 sh. 7% cum. pfd. & 1 sh. com. stock) | 9- 6-28 | 100 | 105 | $1.75 Aug. 1 |
| Keystone Sand & Sup. 6's[47] | 8-22-28 | 99 | 100 | |
| Lawrence P. C.[2] | 9-10-28 | 97 | 103 | 2% qu. Sept. 29 |
| Lehigh P. C.[2] | 9-10-28 | 44½ | 48 | 62½c Aug. 1 |
| Lehigh P. C. pfd.[2] | 9-10-28 | 111 | ..... | 1¾% qu. Oct. 1 |
| Lyman-Richey 1st 6's, 1932[13] | 9- 7-28 | 98½ | 100 | |
| Lyman-Richey 1st 6's, 1935[13] | 9- 7-28 | 99 | 100 | |
| Marblehead Lime 1st 7's[14] | 9- 7-28 | 100 | ..... | |
| Marbleh'd Lime 5½'s, notes[14] | 9- 7-28 | 98 | ..... | |
| Mich. L. & C. com.[39] | 9- 7-28 | 35 | ..... | |
| Missouri P. C. | 9-11-28 | 45 | 45½ | 50c qu. Aug. 1 |
| Monolith P. C. com.[9] | 9- 8-28 | 15 | ..... | 8% ann. Jan. 2 |
| Monolith P. C. pfd.[9] | 9- 5-28 | 9½ | 10 | |
| Monolith P. C. units[9] | 9- 5-28 | 34¾ | 36¼ | |
| National Cement 1st 7's[28] | 9-10-28 | 99 | 101 | |
| National Gypsum A com.[35] | 9-12-28 | 20 | 25 | |
| National Gypsum pfd.[35] | 9-12-28 | 60 | 65 | 1¾% qu. Apr. 1 |
| Nazareth Cem. com. | 9-12-28 | 28 | 32 | 75c qu. Apr. 1 |
| Nazareth Cem. pfd. | 9-12-28 | 98 | 102 | |
| Newaygo P. C.[1] | 12-30-27 | 115 | ..... | |
| Newaygo P. C. 1st 6½'s[32] | 2-11-28 | 120 | ..... | |
| New Eng. Lime pfd., A[45] | 8-11-28 | 94 | 97 | |
| New Eng. Lime pfd., B[28] | 8-13-28 | 97 | 99 | |
| New Eng. Lime com.[22] | 8-13-28 | 32 | 35 | |
| New Eng. Lime 1st 6's[14] | 9- 7-28 | 98 | 100 | |
| N. Y. Trap Rock 1st 6's | 9-11-28 | 100¼ | 100½ | |
| North Amer. Cem. 1st 6½'s | 9-11-28 | 77 | ..... | |
| North Amer. Cem. com.[19] | 9- 7-28 | 7 | 8¼ | |
| North Amer. Cem. 7% pfd.[19] | 9- 7-28 | 27 | 30 | 1.75 qu. Aug. 1 |
| North Amer. Cem. units[19] | 9- 7-28 | 35 | 45 | |
| North Shore Mat. 1st 5's[15] | 9-12-28 | 99 | ..... | |
| Northwestern States P. C.[37] | 9- 8-28 | 195 | 205 | |
| Pac. Coast Cem. 6's. A | 9- 4-28 | 96½ | 98½ | |
| Pacific P. C. new com.[5] | 9- 8-28 | 18½ | 22 | |
| Pacific P. C. pfd. | 9- 8-28 | 78 | 79 | $1.62½ qu. Apr. 5 |
| Pacific P. C. 6's. | 9- 4-28 | 98 | 100½ | |
| Peerless Egyp'n P. C. com.[21] | 9-10-28 | 1½ | 2½ | |
| Peerless Egyp'n P. C. pfd.[21] | 9-10-28 | 70 | 80 | 1¾% qu. July 1 |
| Penn-Dixie Cem. 1st 6's[29] | 9-12-28 | 95½ | 96 | |
| Penn-Dixie Cem. pfd.[29] | 9-12-28 | 75 | 75¼ | $1.75 qu. Sept. 15 |
| Penn-Dixie Cem. com. | 9-12-28 | 14½ | 15 | 50c qu. July 1 |
| Penn. Glass Sand Corp. 1st 6's, 1952 | 9- 4-28 | 101½ | 103 | |
| Petoskey P. C. | 9-11-28 | 9¼ | 10¼ | 1½% qu. |
| Pittsfield L. & S. bonds[31] | 10- 8-27 | ..... | 100 | |
| Pittsfield L. & S. com.[31] | 10- 8-27 | ..... | 25 | |
| Riverside P. C. 1st pfd. | 9- 5-28 | 96 | 97½ | 1.50 Aug. 1 |
| Riverside P. C., A | 9- 8-28 | 21 | 21¼ | 31¼c cum. part. Aug. 1 |
| Rockland-Rockport Lime 1st pfd.[10] | 5-17-28 | ..... | 100 | 3½% s.-a. Feb. 1 |
| Rockland-Rockport Lime 2nd pfd.[10] | 5-17-28 | ..... | 60 | 3% s.-a. Feb. 1 |
| Rockland-Rockport Lime com.[10] | | no market | | 1½% qu. Nov. 2 |
| Sandusky Cem. | 9-11-28 | 203 | ..... | $2 qu. July 2 |
| Santa Cruz P. C. bonds | 9- 8-28 | 105¾ | ..... | 6% annual |
| Santa Cruz P. C. com. | 9- 8-28 | 90 | ..... | $1 qu. Apr. 1 |
| Schumacher Wallboard com. | 9- 8-28 | 21½ | 21¾ | 50c May 15 |
| Schumacher Wallboard pfd. | 9- 8-28 | ..... | 25¼ | |
| Southwestern P. C. units[44] | 9- 5-28 | 270 | ..... | |
| Superior P. C., A[20] | 9- 8-28 | ..... | 45¼ | 27½c mo. Aug. 1 |
| Superior P. C., B[20] | 9- 5-28 | 30 | 32 | |
| Trinity P. C. units[37] | 9- 8-28 | 154 | 160 | |
| Trinity P. C. com.[37] | 9- 8-28 | 52 | ..... | |
| U. S. Gypsum com.† | 9-12-28 | 60¼ | 60⅞ | 2% qu. Sept. 30 |
| U. S. Gypsum, rts. | 9-12-28 | 17¾ | 18 | |
| U. S. Gypsum pfd. | 9-12-28 | 126½ | ..... | 1¾% qu. Sept. 30 |
| Universal G. & L. com.[3] | 9-12-28 | ..... | 1 | |
| Universal G. & L. pfd.[3] | 9-12-28 | ..... | 12 | 1½% Feb. 15 |
| Universal G. & L., V.T.C. | 9-12-28 | no market | | |
| Universal G. & L. 1st 6's[3] | 9-12-28 | 55 | 60 | |
| Upper Hudson Stone 1st 6's, 1951[32] | 12-28-27 | 92 | ..... | |
| Vulcanite P. C. 1st 7½'s[32] | 12- 5-27 | 105 | 109 | |
| Chas. Warner com. | 9-10-28 | 33 | 36 | 50c qu. July 10 & 25c ex. |
| Chas. Warner pfd. | 9-10-28 | 109 | ..... | 1¾% qu. July 26 |
| Whitehall Cem. Mfg. com.[26] | 9- 7-28 | 150 | ..... | |
| Whitehall Cem. Mfg. pfd.[26] | 9- 7-28 | 90 | ..... | |
| Wisconsin L. & C. 1st 6's[15] | 9-12-28 | 100 | ..... | |
| Wolverine P. C. com. | 9-12-28 | 5½ | 6½ | 15c qu. Aug. 15 |
| Yosemite P. C., A com.[20] | 9- 5-28 | 5 | 6 | |

†10% stock dividend, July 10. U. S. Gypsum common holders of record July 14 have the right to purchase new common at $20 a share to the extent of 50% of holdings. Right expires Oct. 1. Payments of 25% are due: Oct. 1, 1928; Feb. 1, June 1, and Oct. 1, 1929. *Called for redemption Oct. 1.

[1]Quotations by Watling, Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willet, New York. [3]Quotations by Rogers, Tracy Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Ralph Schneeloch Co., Portland, Ore. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbit, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hoit, Rose & Troster, New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]Pirnie, Simons and Co., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]Hepburn & Co., New York. [33]Boettcher & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter and Co., Chicago. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick and Co., Montreal, Que. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [41]Hornblower & Weeks, Chicago, Ill. [42]E. H. Rollins, Chicago, Ill. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney Williams & Co., Inc., Los Angeles, Calif. [45]Tifft Pros., Pittsfield, Mass. [46]Stein Bros. & Boyce, Baltimore, Md. [47]Bank of Pittsburgh, Pittsburgh, Pa. [48]E. W. Hays & Co., Louisville, Ky.

## INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

| Stock | Price bid | Price asked |
|---|---|---|
| Benedict Stone Corp. (cast-stone), 50 pfd., 390 com.[1] | $400 for the lot | ..... |
| Benedict Stone Corp. 1st 7's 1934[8] | ..... | 86 |
| International Portland Cement Co., Ltd., pfd. | 30 | 45 |
| Knickerbocker Lime Co.[4] | 105 | ..... |
| Missouri Portland Cement Co., 7% serial bonds | 104¾ | 104¾ |
| Olympic Portland Cement Co.[7] | ..... | £1⅝ |
| Simbroco Stone Co.,[10] 10 sh. pfd., par $50 | $10.25 per sh. | |
| Southern Phosphate Co.[6] | 1¼ | ..... |
| Vermont Milling Products Co. (slate granules), 22 sh. com. and 12 sh. pfd.[6] | $1 for the lot | ..... |
| Wabash Portland Cement Co.[1] | 60 | 100 |
| Winchester Brick Co., pfd., sand lime brick[5] | 10c | ..... |

[1]Price obtained at auction by Adrian H. Muller & Sons, New York. [2]Price obtained at auction by Weilupp-Bruton and Co., Baltimore, Md. [4]Price obtained at auction by Barnes and Lofland, Philadelphia, on April 4, 1928. [5]Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. [6]Price obtained at auction by Wise, Hobbs and Arnold, Boston, Mass. [7]Neidecker and Co., London, England. [8]Auction sales of $1000, Barnes & Lofland, Philadelphia, March 31, 1928. [10]Price at auction, June 6, 1928, R. L. Day & Co., Boston, Mass.

## North American Cement Six Months' Earnings

THE NORTH AMERICAN CEMENT CORP. reports sales and earnings for the first six months of 1928 as follows:

| | |
|---|---|
| Net sales | $2,249,371 |
| Cost of sales | 1,443,884 |
| Gross profit | $ 805,487 |
| Selling and other expenses | 366,007 |
| Net profit | $ 439,480 |
| Miscellaneous earnings | 19,120 |
| Gross earnings | $ 458,600 |
| Interest and amortization expenses on bonds | 283,768 |
| Depreciation and depletion | 260,219 |
| Deficit | $ 85,388 |

## Called for Redemption

IRON CITY SAND AND GRAVEL CO., Pittsburgh, Penn., has called for redemption September 1 at 102 and dividends all of the outstanding 5-year 6% trust certificates, series A, dated Sept. 1, 1927. Payment will be made at the Union National Bank of Pittsburgh, trustee, Fourth avenue at Wood street, Pittsburgh, Penn.

Dewey Portland Cement Co., Kansas City, Mo., has called for redemption on Oct. 1, at 103½% and interest certain outstanding first mortgage 6% serial gold bonds, series A, dated April 1, 1926 (aggregating $500,000). Payment will be made at the Chicago Trust Co., 81 W. Monroe street, Chicago, Ill.

The first mortgage 7% serial gold bonds of the Consumers Rock & Gravel Co., Los Angeles, Calif., have been called for redemption as of Sept. 1, 1928.

The entire issue of Hercules Cement Corp. (Philadelphia, Penn.) 20-year 6's of 1937 has been called for redemption as of Sept. 12 at $102.

## New Bessemer Stock Available

THE stockholders of the Bessemer Securities Co., Youngstown, Ohio, have voted to increase the authorized capital to 200,000 shares of no-par value common from 120,000. There will be 25,000 to 30,000 of the additional shares marketed at this time at $30, it was stated. The proceeds will be applied to the purchase of stock in the Peerless Egyptian Cement Co. of Detroit, which the Bessemer company now controls.

## Arundel Corp. Earnings

THE Arundel Corp. reports for the month of July, 1928, net income of $122,594, a decrease of $103,021 compared with July, 1927.

Net income for the seven months ended July 31, 1928, was $974,425.

The balance sheet as of July 31, 1928, showed current assest of $4,024,599 and current liabilities of $1,533,893, leaving net working capital of $2,490,706.

Frank A. Furst, chairman of the board said the corporation had $16,000,000 in unfilled contracts and was again working on a normal basis, following the delay caused by heavy storms in the territory in which it was operating.

## Hercules Cement Increases Capital

THE stockholders of the Hercules Cement Corp., Philadelphia, Penn., on August 30 voted to increase the authorized capital stock from 25,000 shares consisting of 5,000 shares of preferred stock (par $100) and 20,000 shares of common stock (without par value) to 35,000 shares consisting of 5,000 shares of preferred stock (par $100) and 30,000 shares of common stock (without par value).

President Morris Kind in a letter to stockholders, says:

"A review of the business of the company since its incorporation shows that it has been fairly successful, and for some time the directors have been endeavoring to formulate a policy which would enable the stockholders of the company to receive a return on their common stock.

"A large portion of the profits earned in the past has been devoted to the reduction of the mortgage debt of the company and to payment for improvements and additional property. The mortgage debt has been reduced from a total of $1,149,000 to $654,000. In addition there is a mortgage now reduced to $110,000 on the company's Jersey City property.

"The improvements to the plant have been completed and paid for and the company does not seem to be facing any material expenditures in this direction. In order to place the company's financial status in the best possible position and at the same time to enable it to distribute at least a part of its earnings to stockholders by way of dividends, the board of directors on August 11, 1928, unanimously determined to redeem the outstanding mortgage bonds to propose an increase of the common stock of the company and to offer to common stockholders 11,250 shares of common stock at $65 per share, which is in the proportion of three new shares for each five shares of common stock now owned.

"If this action is approved the new shares which are not purchased by present stockholders will be underwritten at $65 per share without cost to the company by the firm of Wolf Bros. & Co., one of whose members is a director of this company.

"The proceeds of the sale of stock will enable the company to pay off all its outstanding bonds and to pay the mortgage of $110,000 on its Jersey City property, leaving it absolutely free of debt with a capital structure of $500,000 of preferred stock and 30,000 shares of common stock.

"I doubt if any cement company is in so advantageous a position as this company will be if the proposed program is approved by the stockholders. There will no longer be necessity for conserving assets for the purpose of retiring mortgages and with the expenditure of very little more money than the company has been paying by way of interest and amortization on its funded debt it will be possible to pay the stockholders a substantial return on the common stock."

### *To Redeem Outstanding Bonds*

The corporation has exercised its right to pay and redeem at 102 and interest all the bonds issued under indenture made September 12, 1916, between the corporation and the Real Estate Title Insurance and Trust Co. of Philadelphia unpaid on the next interest period, namely, September 12, 1928.

## Lehigh Cement Earnings

THE Lehigh Portland Cement Co. in the year ended August 31 earned a net profit of $3,814,393, after all charges, equal to $5.07 a share earned on the common stock.

## Dolese and Shepard Pays 12% to Date This Year

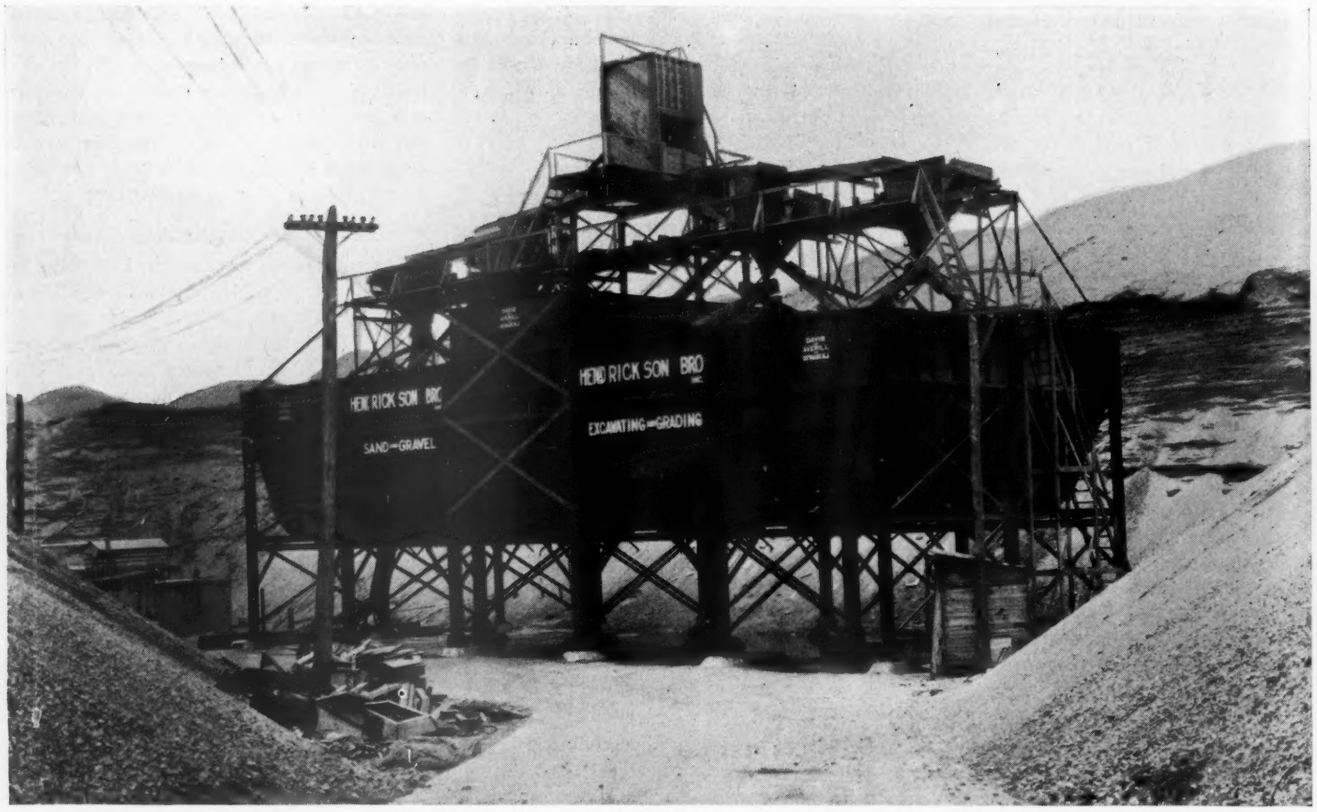
THE DOLESE AND SHEPARD CO., one of the largest producers of crushed stone in the Chicago, Ill., district, have a dividend record for 1928, according to the *Chicago Tribune*, as follows: $2 quarterly, January, April, June and October, two extra dividends of $1.50 in January and April and $1 extra in October.

## American Agricultural Chemical Readjustment

A CAPITAL READJUSTMENT is rumored for American Agricultural Chemical Co. in order to take care of the accrued dividends on the preferred stock. They now amount to over 40%. Basis for the report that management might turn its attention to these accruals is founded on the improved conditions existing in the fertilizer industry. The company's fiscal year ended June 30 and annual report will soon be made public. Since the past spring was one of the best selling seasons in several years, a decidedly favorable statement is looked for.—*Wall Street News* (New York City).

## Recent Dividends Announced

| | |
|---|---|
| Atlas Portland Cement com. (quar.) | 50c, Sept. 1 |
| Canada Cement pfd. (quar.) | 1⅝%, Sept. 30 |
| Certainteed Products com. (quar.) | $1, Oct. 1 |
| Certainteed Products pfd. (quar.) | $1.75, Oct. 1 |
| International Cement com. (quar.) | $1, Sept. 28 |
| Lawrence Portland Cement (quar.) | 2%, Sept. 29 |
| Lehigh Portland Cement pfd. (quar.) | $1.75, Oct. 1 |
| Penn-Dixie Cement pfd. (quar.) | $1.75, Sept. 15 |




*The washing and distributing plant of Hendrickson Bros., at Mineola, L. I., showing the duplicate sets of bins, the alternate use of which permits the sand being dewatered during a 24-hr. period before it is shipped*

# This Plant Shows 25% Saving Through Duplicate Bin Installation

## New Sand and Gravel Washing and Distributing Plant of Hendrickson Brothers, Mineola, Long Island, N. Y.

By J. L. Averill
Davis and Averill, Inc., Newark, N. J.

THE trend toward greater efficiency in operation, with corresponding decrease in cost of production, is growing more and more marked among the leading producers and distributors of washed sand, gravel and affiliated products in all parts of the country. The old make-shift equipment of years ago, with improvised means of handling, conveying, storing, loading, etc., is decidedly a thing of the past—the modern sand and gravel plant cannot afford to have anything but the best and most efficient. Present day competition demands it.

The development in different phases of sand and gravel operations has been brought about through the application of engineering ability and skill in the design and manufacture of equipment which would accomplish better work in a shorter time and at less cost. This means a reduction in necessary labor, easier and simpler means of handling and distributing, with increased output at lower cost per unit of measurement, whether cubic yard or ton. Moreover, it has effected permanent equipment and installations that would last for an extended period of time with only slight cost of ordinary upkeep.

We have all become familiar with the elevated steel bin for sand and gravel handling, and are likely well aware of the efficiency of properly designed units of this kind in regular operating service. The single or double unit bin installation for the small plant, or the equivalent increase in number of such units for the larger plant, is now giving way to what might be termed a multiple bin installation, to provide continuous operation at all times and still lower costs of production and distribution.

### *Multiple Bin Plan*

The multiple bin plan provides for the installation of a duplicate set of steel bin units, or two groups of like size and capacity which can be alternated over any given period of time, usually about 24 hours, with each series of bins in continuous service throughout the cycle. Thus, there is no interruption in production, with contingent higher efficiency under lower costs.

A recently completed installation of this kind at the washed sand and gravel plant of Hendrickson Brothers, Mineola, L. I.,

R. E. Martin, engineer, described in the following, is of particular interest in showing how the multiple bin plan has accomplished even more than anticipated initially by the company and its engineers, Davis and Averill, Inc., Newark, N. J.

### *Installation at Mineola*

The installation at the Mineola plant consists of ten bins, arranged in two series or rows of five each, as shown in the accompanying illustrations. These bins have a total capacity of 1400 cu. yd. of material. The dimensions are 85 ft. long, 35 ft. wide, with height from ground to top of lower bins of 27 ft. 4 in., and of higher bins, or the two central units, 32 ft. 4 in. The bins are designed to support settling tanks and screens overhead, as will be noted from the illustrations.

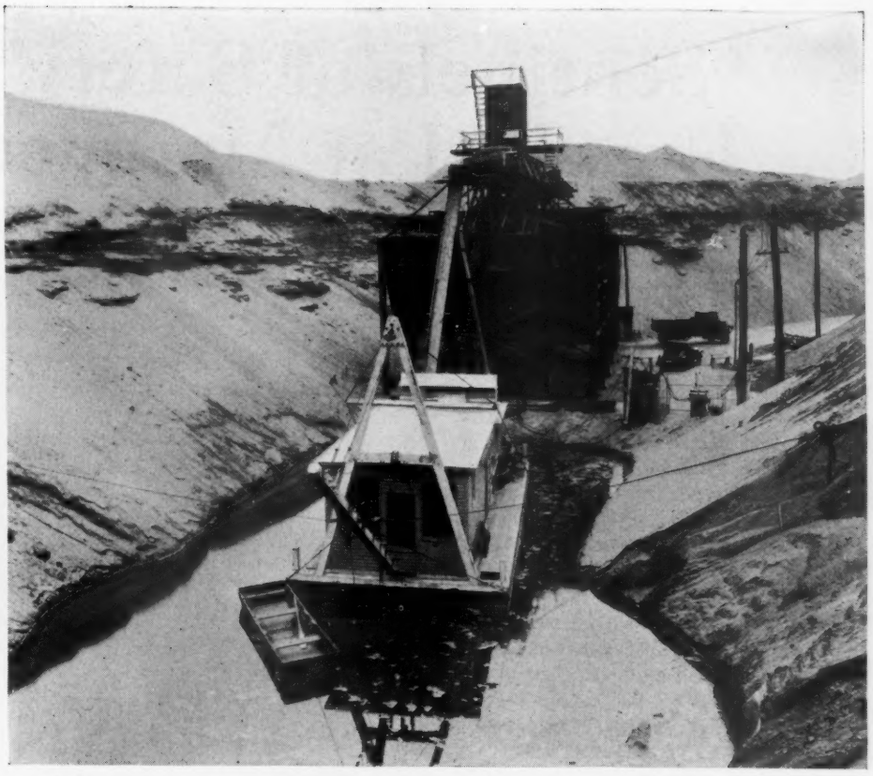
The bin materially is of standard steel of best grade and proper thickness to allow for heavy character of continuous service. The structural steel framework supporting the bins is of standard shapes, resting on concrete footings. Sufficient bracing is provided to withstand any condition of operating or the action of the elements. The entire installation is one of rugged, permanent type. In other words, these bin units while permanent wherever they may be located, can easily be dismantled, removed to another site and re-erected, without loss of material and with labor cost at a minimum. Only new concrete footings, a trivial matter, are required.

The method of operation is practically self-explanatory from an inspection of one of the illustrations herewith. The sand and gravel is pumped from the pit into one of the groups of bins through screens and settling tanks. Here it is allowed to dewater for a period of 24 hours. Meantime, there is no loss of time, but the other set of five bins similarly are filled from the pit, and likewise allowed to dewater for 24 hours. While this is being accomplished in the second series of bins, the material from the first bins is being loaded into trucks and hauled to the job, and when empty, are filled again, while the second group of bins is being unloaded onto motor trucks. The process is alternated every 24 hours, as intimated.

Each bin has three duplex gates in the bottom of special type, designed to permit a drain of the water from the sand and gravel, and at the same time, retain the material itself in the bin. This is being accomplished without loss of sand or gravel, and is a particular feature of an installation of this kind which requires special attention.

### *Advantages in Service*

The advantages of an installation of the type described may be summed up in a few words. In loading trucks with wet sand, the load distinctly is a level body of sand *plus* water, and naturally, suitable allowance must be made to the customer for the water content. Accordingly, the net amount of sand or gravel hauled per truck actually is less than the truck load or the truck capacity.



***The dredge of the Hendrickson Bros. plant delivers material directly to the washing plant located on top of the double set of bins***

At the Mineola plant, the motor truck can be heaped up with dry sand or gravel without handling from pit to loading gate, and consequently a larger tonnage can be hauled on each truck load. There is no credit required to the customer for any water content and the cost per cubic yard for handling the material is appreciably less. The savings at this plant through the multiple bin arrangement total from 20 to 25%. A reduction in cost of this extent is not only worth while, but it will pay for an installation of this kind over a short period of time.

Additionally, other considerations are evidenced. Dry sand or gravel is much more easily handled through chutes or hoppers on the job than wet material, and consequently, contractors, builders or other consumers show preference for securing dry sand and gravel. When delivery of such material readily is possible under a simple and economical installation as here described, it is certainly to the producer's advantage to sense the desire of the trade, for in the end he profits by better and more efficient production, coupled with higher market level for quality dry sand or gravel.

The installation at Mineola was made under the personal supervision of the author as chief engineer and head of the engineering company previously mentioned, which designed and constructed the complete unit.

---

## Bethany, Missouri, Quarry Working Two Shifts

NEARLY 70 men are finding steady employment now at the Bethany stone quarry. A night shift was added recently and since then operations have speeded up until production had reached between six and seven carloads of crused stone daily from the two shifts.

The number of employes have averaged about 32 on each shift for the last week. D. R. Keedwell, superintendent for the Concrete Material Corp., said 34 men were working each shift.

Production is only at about half capacity, Mr. Keedwell said. The "working face" of stone in the quarry gradually is being enlarged and the output is expected to reach about fifteen cars daily.

Three trucks are kept busy in the pit, hauling stone to the crushers. At capacity operation six trucks will be used for that purpose, with six laborers for each truck to break up and load the rock. Three other trucks are working on top of the rock ledge, hauling away surface dirt as it is scraped off by the shovel.—*Bethany* (Mo.) *Clipper.*

# "Sentinels of Safety" Trophy Unveiled at Marquette Plant

## Another Cement Manufacturing Organization Captures Prize Offered to All Mines and Quarries by the Bureau of Mines

ON AUGUST 11 occurred the unveiling of the "Sentinels of Safety" trophy awarded to the limestone mine of the Marquette Cement Manufacturing Company at La Salle, Ill., by the United States Bureau of Mines. The Marquette mine, one of the few limestone mines supplying raw material for portland cement manufacture, captured the coveted Bureau of Mines trophy by operating without a lost time accident during 1927. Mines and quarries throughout the country were entered as contenders for the prize which went to the Marquette organization because of the perfect safety score and the large number of man-hours worked.

***Presentation Ceremony***

Services connected with the unveiling took place at the plant at 2 o'clock Saturday afternoon, August 11. John J. Kelly, manager of industrial relations of the Marquette company, acted as chairman. A. U. Miller, field engineer of the U. S. Bureau of Mines, presented the trophy, which was accepted by Richard Moyle, Sr., general superintendent, and Charles Spurr, mine superintendent. Little Miss Darlene Spurr unveiled the trophy and music was furnished by the Marquette band. Mr. Miller also presented a number of certificates of merit in safety work to members of the mine force.

The "Sentinels of Safety" trophy, which has been won annually for several years by quarries operated by cement manufacturers, is given by the *Explosives Engineer Magazine* (Hercules Powder Co.) in the interests of mine and quarry safety. The fact that cement organizations have been able to win the trophy each year has been commented on frequently as a fine indication of the effectiveness of their co-operative safety work.

***Miss Darlene Spurr unveiling the "Sentinels of Safety" trophy***

The success of the united efforts made by the cement industry for safety is nowhere better illustrated than in competition against industries carrying on similar operations but where safety is not stressed to such an extent.

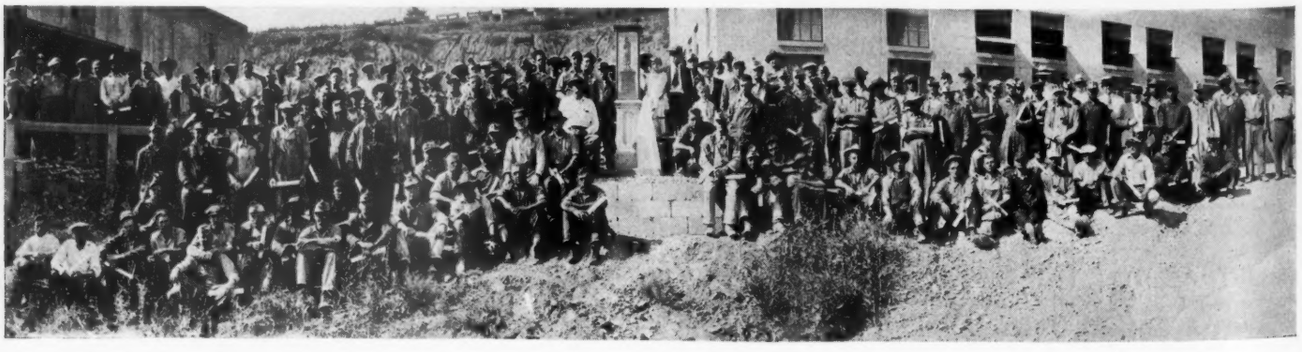
---

## Illinois Farmers Beginning to Appreciate Quality in Gravel

THERE was a meeting of taxpayers of Dimmick township, Mendota, Ill., held at the town hall recently, called by A. M. Pottinger. It was a protest against the using of gravel taken from Long's pit on the roads that are to be improved under the $30,000 bond issue which was carried at the spring election. They want gravel from the Spring Valley pit or else from the Myrtle gravel bed near Spring Valley.

A committee composed of Charles Robinson, Charles Mitchell and A. M. Pottinger was appointed to go to Ottawa and visit Mr. Farnsworth, county highway commissioner, and see what can be done in the matter. It is said the objectors declare that when such a large sum of money is spent on the roads of their township they want something to show for it and are willing to get out an injunction to stop the authorities from using inferior gravel. By using the Spring Valley gravel, which will cost more money, the committee claim they will have at least $5,000 left over the above what is needed for graveling the roads.

The outcome of this meeting and the desire to have gravel that will pack and give service is watched with much interest.—*Mendota* (Ill.) *Reporter.*



***The employes of the La Salle, Ill., plant of the Marquette Cement Manufacturing Co. gathered for the presentation of the "Sentinels of Safety" trophy***

# Safety Code Devised at Manitowoc Portland Cement Plant

## Use of a List of Reminders Cuts Accidents to a Small Figure at the Plant of the Manitowoc Portland Cement Company

RECENT encouraging strides in the reduction of accidents at the plant of the Manitowoc Portland Cement Co. have been due in a large measure to faithfully following the precepts of a simple safety code devised by the plant's chief chemist, H. B. de Pont, according to a letter recently written to the National Safety Council by F. E. Town, superintendent of the Manitowoc plant. In making public the code in order that others may profit by its use, Mr. Town, who is chairman of the cement section of the council, says:

"At the request of our very earnest and active safety committee, Mr. dePont undertook the preparation of a code of safe practices for our operating employes. This was done in the spirit of providing a simple set of personal reminders, as preferable and probably more effective than a stern list of rules to be rigidly observed on pain of dismissal. The appeal was made to the common sense of our employes and judging by the results secured, Mr. dePont and the committee have succeeded to a very encouraging extent.

"Our operating organization has completed some more or less hazardous construction work with a number of inexperienced men without any lost time accidents and with only a few minor injuries such as those requiring the application of a little mercurochrome. In fact, we had only four lost time accidents in 1927, which we feel was extremely good in view of previous records. This year to date we have had but two lost time accidents, and our plant made clear showings in both the June and July campaigns. This fine record is attributed largely to the good effect of this code on our men.

"I am sure that our safety committee, as well as all of our employes, welcome the opportunity to pass this code along as a successful example for others who may be seeking something of this kind. Of course it goes almost without saying that good results with a code of this kind do not come automatically. The following reminders are carefully gone over with every new workman and are brought to the frequent attention of every one of our men."

The code is as follows:

### The Complete Code

THESE THINGS WILL I REMEMBER

*1. To report to the laboratory immediately any injury to myself.*

*2. To see that my fellow worked goes to the laboratory if he is injured.*

*3. To understand that the slightest scratch or bruise may mean lost time or even worse if not attended to.*

*4. To be careful around moving machinery, moving objects, and objects swinging on tackle or chain falls.*

*5. To keep my feet clear of heavy objects being lowered to the floor.*

*6. To never tamper with gears, belts, etc., while machine is in motion.*

*7. To see that ladders are securely blocked before I use them, and scaffolds properly made—no rotten or knotty boards or braces, and to inspect all slings, tackles and cable clips.*

*8. To protect my eyes from dust and sparks from cutting torches and the heat and glare from cutting and welding. Also the dust from emery wheels.*

*9. To lift properly and use my muscles as they should be used.*

*10. To ever watch my step and practice safety at my work, at my home, and on the street.*

*11. That my strict observance of these principles will enable my company's employes to maintain the highest possible standard of "Safety First" ethics.*

### Brief But Comprehensive

"The above code very accurately covers the range of cement plant accidents. It is particularly interesting because it recognizes that the personal injury mishaps in the cement industry rarely have anything in particular to do with cement making—most of them probably occur at least as frequently in a mill or factory of any kind or on the street.

"Notice reminders Nos. 1, 2 and 3. It is believed that nearly 10% of all the lost time accidents in cement mills last year occurred because of infections following failure to report for first aid, although cement mills have been trying for years to get men to come in immediately for attention to even small scratches, and much progress certainly has been made during the last year or two.

"The other suggestions relative to keeping away from moving machinery, watching out for the feet, carefully securing ladders and inspecting scaffolds, lifting properly, protecting the eyes and keeping generally on the alert, cover the great preponderance of all cement mill accidents."

---

## C. Kemble Baldwin

C. KEMBLE BALDWIN died in Los Angeles on August 9. He had been identified with the belt conveyor from the time when it was first used on a large scale. After graduating from Lehigh University in 1895, he first found employment in the anthracite coal field and in 1898 joined the engineering force of the Robins Conveying Belt Co., which was then introducing the belt conveyor as a means of handling heavy materials. Soon afterward Mr. Baldwin became chief engineer of the company, and he was largely responsible not only for many improvements in conveying machinery, but for its introduction into many fields in which it is now indispensable. As a striking instance may be mentioned the byproduct coke industry with which Mr. Baldwin became closely identified at an early date.

Through his close study of all the technical requirements and his sound engineering judgment he became a recognized authority in the design of these plants. His courage and his pioneer spirit were attracted by these new problems and he possessed the vision and courage which were required for their solution. His thorough mastery of the entire subject and his honesty of purpose were so apparent that clients frequently gave him a free hand in fixing the design and cost of their equipment.

The 30 years of his active career were contemporaneous with an enormous growth in industrial quantities of all kinds. During that period the capacities of conveyors and vessel unloading machinery was increased tenfold, and few, if any, individuals can be credited with having made a larger contribution to that development than was supplied by Mr. Baldwin.

He was a member of many technical societies, including those of the Mining and Mechanical Engineers, the Iron and Steel Institute and the Western Society of Engineers. He had a remarkable collection of works on aviation.

The technical side of Mr. Baldwin's life was, however, less notable to his friends and associates than was the human side. He truly loved his fellowman and devoted much time to the assistance and development of young associates. There was no limit to his kindness or to his courage, and his example was an inspiration to all who knew him.

## Sand-Lime Brick Production and Shipments in August

THE following data are compiled from reports received direct from 27 producers of sand-lime brick located in various parts of the United States and Canada. The number of plants reporting is three more than those furnishing statistics for the July estimate published in the August 18 issue. The statistics below may be regarded as representative of the entire industry, the reporting plants having about one-half the production capacity in the United States and Canada.

There is apparently very little difference in the sand-lime brick figures for August from those of July. Production is increased slightly, with only four plants reporting no production as against five in July. Shipments average about the same as during the previous month, and unfilled orders remain at about the same figure. There is a slight increase in the amount of bricks on hand at the various plants. No changes of consequence are noted in the prices for August.

The following are average prices quoted for sand-lime brick in August:

***Average Prices for August***

| Shipping Point | Plant Price | Delivered |
|---|---|---|
| Albany, Ga. | $10.00 | $11.50 |
| Boston, Mass. | ..... | 16.00 |
| Buffalo, N. Y. | 12.25 | 16.50 |
| Dayton, Ohio | 12.50 | 15.50 |
| Detroit, Mich. | ..... | 16.00 |
| Detroit, Mich. (less 5%) | ..... | 15.50@16.00 |
| Detroit, Mich. | 13.00 | 15.50 |
| Detroit, Mich. | ..... | 15.75 |
| Grand Rapids, Mich. | 12.50 | ..... |
| Hartford, Conn. | 14.00 | 19.00 |
| Jackson, Mich. | 12.25 | ..... |
| Madison, Wis. | 12.00@12.50 | 13.00@14.00 |
| Menominee, Mich. | 11.00 | 14.50 |
| Milwaukee, Wis. | 10.50 | 13.00 |
| Minneapolis, Minn. | 10.00 | 12.00 |
| Mishawaka, Ind. | 11.00 | ..... |
| New Orleans, La. | ..... | ..... |
| Pontiac, Mich. | 12.00 | 14.00 |
| Rochester, N. Y. | ..... | 19.75 |
| Saginaw, Mich. | 12.00 | ..... |
| San Antonio, Texas | ..... | 14.00 |
| Sebewaing, Mich. | ..... | ..... |
| Sioux Falls, S. D. | ..... | ..... |
| Syracuse, N. Y. | 18.00 | 20.00 |
| Toronto, Canada | 12.50 | 15.00 |
| Toronto, Canada (less 5%) | 12.00 | 15.00 |
| Winchester, Mass. | ..... | 16.00 |

The following statistics are compiled from data received direct from 27 producers of sand-lime brick in the United States and Canada:

***Statistics for July and August, 1928***

| | *July | †August |
|---|---|---|
| Production | 18,071,800 | 21,680,100 |
| Shipments (rail) | 6,054,700 | 8,284,400 |
| Shipments (truck) | 11,771,600 | 13,214,500 |
| Stocks | 12,591,300 | 14,445,800 |
| Unfilled orders | 11,762,000 | 14,503,000 |

*24 plants reporting.
†Incomplete, twelve plants not reporting unfilled orders.

***Notes from Producers***

Wisconsin Brick Co., Madison, Wis., are furnishing brick for the new office building and bus station of the Wisconsin Power and Light Co. in Madison. The company is also supplying brick for the new addition to the Madison General hospital.

Sioux Falls Pressed Brick Co., Sioux Falls, S. D., has gotten out a small announcement outlining some of the advantages of sand-lime brick which is used in the company's mail to spread the "gospel" of sand-lime brick in South Dakota.

## Sand-Lime Brick in Canada in 1927

PRODUCTION from the sand-lime brick industry in Canada during 1927 amounted in value to $939,911 as compared with $629,672 in the previous year and $854,055 in 1926. This output included 72,864,000 sand-lime bricks valued at $864,911 as compared with an output of 50,282,000 brick worth $606,400 in the previous year and 68,869,000 valued at $854,055 in 1925. The balance of the output in each year consisted mainly of hollow building blocks.

There were 11 plants in operation during the year, of which seven were located in the Province of Ontario, two in Quebec and two in Manitoba. The capital invested in the industry during the year amounted to $1,586,064, wages and salaries were $300,318.

## Length Changes in Sand-Lime Brick When Wet

THE FACT that most materials expand when wet and shrink when dry is sufficiently well known to need no comment. The magnitude of this change, however, has not been measured in the case of many materials; as, for example, in sand-lime brick. While it has been assumed that the actual length changes on wetting or drying of brick are small, it was felt that some experimental data on these changes should be developed.

The Bureau of Standards has received a large number of sand-lime brick from various sources for use in an extensive investigation of the properties of these brick. Representative samples from five different localities were selected for measurements of the length changes on alternate wetting and drying.

Gauge marks were placed on each brick approximately 17 cm. apart, and the increase or decrease in the distance between these marks was measured by a comparator which was graduated to 0.001 mm. The brick were put through the sequence of operations shown in the first column of the table. The length between the gauge marks on the air-dried brick was taken as unity and other lengths were calculated on the basis. Each figure is the average of four separate readings.

It will be noticed that the brick expanded on being immersed in water. On thoroughly drying they contracted to less than the original air dry length, and on subsequent treatments did not in any case return to the length when first wet.

The magnitude of the changes was very small. The maximum change, case B, would only amount to about 0.1 in. in a 10-ft. wall. This is sufficiently small to be neglected in most commercial work.—*Technical News Bulletin* of the U. S. Bureau of Standards.

LENGTH CHANGES IN SAND-LIME BRICK WHEN WET

| Source of brick | Relative Lengths A | B | C | D | E |
|---|---|---|---|---|---|
| Air dried | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| In water for 48 hours | 1.00010 | 1.00012 | 1.0009 | 1.00038 | 1.00008 |
| Air dried for 48 hours | 1.00004 | 1.00005 | 1.00004 | 1.00029 | 1.00006 |
| Dried at 110 deg. C. for 40 hours | .99978 | .99964 | .99973 | .99969 | .99992 |
| Boiled 5 hours | 1.00004 | .99998 | 1.00001 | 1.00032 | 1.00007 |
| Air dried for 48 hours | 1.00000 | .99996 | .99999 | 1.00022 | 1.00004 |
| Dried at 110 deg. C. for 40 hours | .99972 | .99921 | .99962 | .99961 | .99982 |
| In water 28 hours | .99998 | .99993 | .99996 | 1.00028 | 1.00001 |
| Air dried 24 hours | .99996 | .99992 | .99994 | 1.00017 | .99997 |
| Dried at 110 deg. C. for 40 hours | .99971 | .99923 | .99963 | .99965 | .99980 |
| Maximum change | .00039 | .00091 | .00047 | .00077 | .00028 |

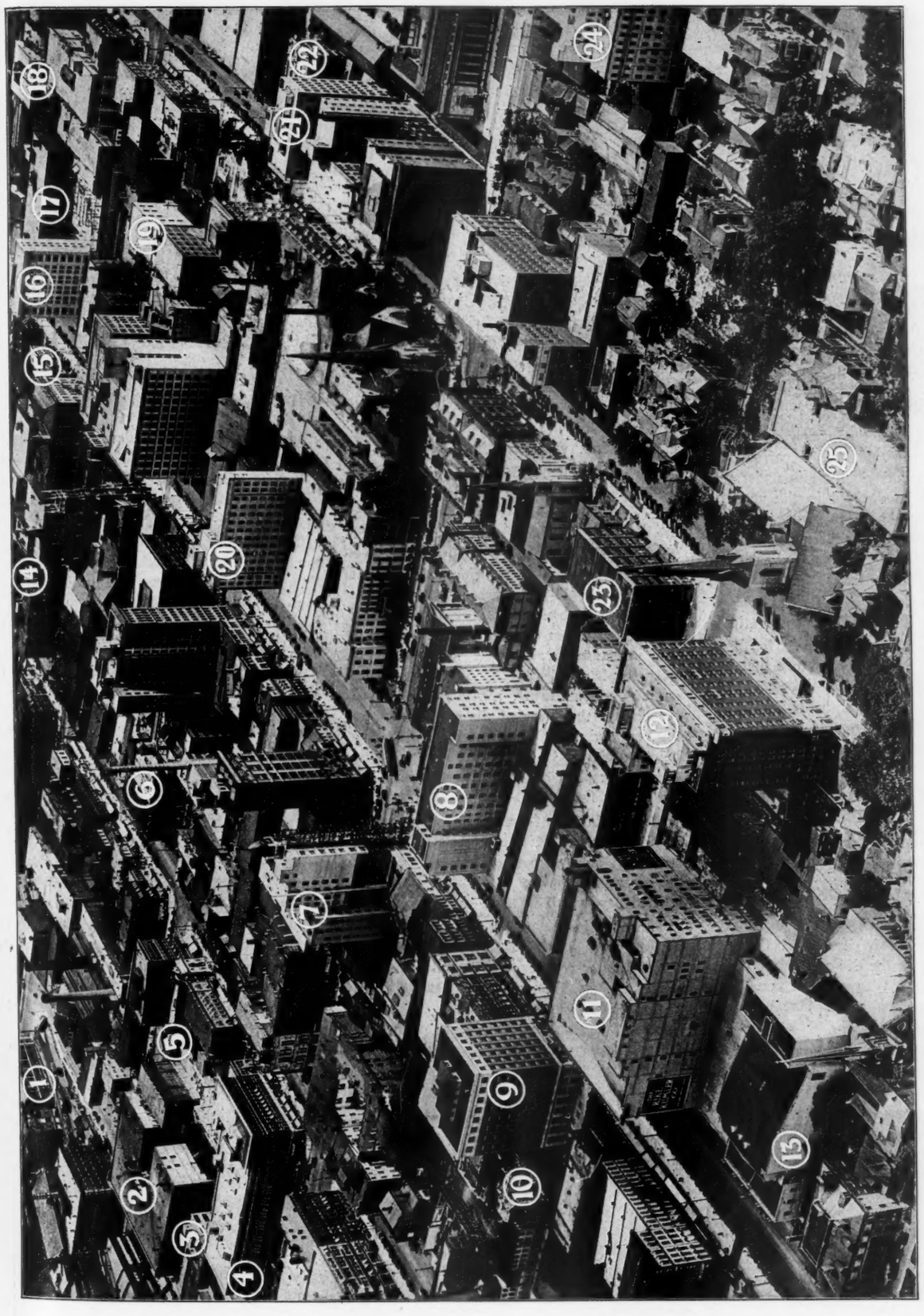
## Sues to Keep Silica Tariff

DECLARING that restoration of Belgian sand to the free duty list would cause irreparable injury to the company, the Nevada Silica Corp. on August 24 filed an injunction suit against Secretary Mellon, Assistant Secretary Lowman of the Treasury Department; Ernest W. Camp, customs bureau commissioner, and Frank Dow, assistant customs bureau commissioner, to prevent such a step.

The company asked the District Supreme court to prevent the reversal of Treasury Decision 42,820 in reference to Belgian sand used in the manufacture of glass. The court was told that the decision, rendered on June 15, held that Belgian sand is silica and dutiable at the rate of $4 a ton, but that the Treasury Department is about to reverse this decision and to restore Belgian sand to the free list.—*New York* (N. Y.) *Times*

## South Dakota Experimenting with Gravel Roads

THE state highway commission of South Dakota is experimenting with three modes of surfacing roads in anticipation of the completion of 6000 miles of gravel surfaced roads in the state trunk system and of the exhaustion of gravel deposits in some parts of the state. It is hoped to use one or more of these methods in maintaining roads already graveled and those which are still to receive gravel coating. Calcium chloride treatment on a six-mile stretch has proven satisfactory in producing an even and dust-free surface. Oil will be tried on a four-mile stretch of gravel surface and tar, mixed with crushed rock to form a mat, will be applied to still another section. A comparison of the three methods is expected to yield valuable information.—*Minneapolis* (Minn.) *Journal.*



*Airplane view of the business district of Dayton, Ohio, with the sand-lime brick buildings indicated*

KEY TO BUILDINGS

1. Dalry Products Co.....100,000
2. Schwind Power Bldg.....350,000
3. C. S. Catalano Co.....200,000
4. Dickey Bldg. and Annex.....300,000
5. Dayton Journal Bldg.....300,000
6. Rauh Bldg.....200,000
7. City National Bank.....300,000
8. Dayton Savings and Trust Co.....350,000
9. Mutual Home Bldg.....500,000
10. Winters National Bank.....100,000
11. Rike-Kumler Co.....850,000
12. Miami Hotel.....650,000
13. Loew's Dayton Theater.....1,000,000
14. Shaw Building.....200,000
15. Jefferson Main Arcade.....250,000
16. Fidelity Bldg.....500,000
17. Reed Furniture Co.....250,000
18. Antler Hotel.....200,000
19. Elder & Johnston Co. Wise.....400,000
20. Lindsey Bldg.....350,000
21. Schwind Bldg.....400,000
22. Dayton News Publishing Co.....100,000
23. Sheley Bldg.....250,000
24. H. W. C.....850,000
25. Heathman Garage.....250,000

## Sand-Lime Brick in Dayton

THE accompanying airplane view of the Dayton, Ohio, business district well illustrates the amount of sand-lime brick which is going into the construction of that city. In all of the 25 buildings numbered on the picture sand-lime brick were used as common brick, and in nearly every one of the large buildings shown this type of brick was also used for facing on two or more sides. This is only one example of the increasing popularity and belief in the sand-lime brick which are being produced at this time in this city and over the country generally.

## R. G. Lassiter Buys North Carolina Granite Quarry

THE property of the Alexander Granite and Land Co., Statesville, N. C., comprising a quarry in Alexander county, 20 miles northwest of Statesville, has been sold to R. G. Lassiter of Oxford, N. C. At the same time the lease on the property, which was held by the Hiddenite Crushed Stone Co. of Concord, N. C., was acquired by Mr. Rossiter. The total consideration in the deal, which involves one of the largest crushed stone operations in North Carolina, amounted to $145,000.

The sale of this property takes in all of the granite deposits of the Rocky Face Mountain quarry as well as six miles of railroad leading from the quarry to the Taylorsville-Charlotte branch of the Southern railway. At present the quarry is turning out an average of 10 or 12 carloads of crushed stone per day and it is understood the output will be doubled in the near future. The quarry has been in operation for about six years and has been operated by the Hiddenite Crushed Stone Co., who had this property leased from the Alexander Granite and Land Co.

It is reported that there is practically an inexhaustible supply of granite on the property, and that it is of such texture that it is readily crushed. It also possesses the strength necessary for use in road work and for ballast, and has been used extensively by the Southern railroad, highway contractors and general builders.—*Statesville* (N. C.) *Landmark*.

## Small Crushing Plant Wrecked by Blast

By J. M. COX

A BLASTING ACCIDENT at the quarry of the M. O. Weaver Co., Osborne, Ohio, July 26, cost the life of Vern Weaver, brother of M. O. Weaver, and completely wrecked the crushing plant. One workman was also seriously injured.

The operation was a temporary one, for supplying crushed stone for a local paving job. The machinery and equipment had been supplied by the Iowa Manufacturing Co., Cedar Rapids, Iowa. The plant was of simple design with primary jaw crusher, a bucket elevator to a scalping screen, a secondary crusher for oversize and a conveyor to sizing screens and bins. The plant was practically in a straight line with the primary crusher nearest the quarry face.

The face of the quarry is about 30 ft. high and eight well-drill holes, with a burden of about 8 ft., had been loaded for the blast with 200 lb. of explosive each, which was a heavier charge than had been used previously.

While the face appeared from superficial examination to be solid ledge, it was subsequently evident that the lower part was shattered or broken and therefore offered little resistance to the explosive. The result was a windrow of stone blown out several hundred feet, wrecking the plant and killing and injuring the men who were near the primary crusher, about 150 ft. from the quarry face. The shot was fired electrically by Vern Weaver and an assistant from under a runway at the crusher.

The force of the explosion and rain of rock tore the 11-ton crusher from its base and moved it about 20 ft., twisting the steel I-beams on which the crusher was mounted. The structure carrying the scalping screen was completely destroyed. This screen was mounted about 15 ft. above ground level. Apparently the force of the explosion went horizontally from the quarry face at a height of 10 or 12 ft. from the ground surface of the plant site, which was 8 ft. below the quarry floor level.

Elevator buckets from the primary crusher to the scalping screen were flattened, and structural steel frames of the conveyors to the secondary crusher and to the bins were twisted beyond all hope of salvage.

The two jaw crushers were undamaged except for broken spokes in the fly wheel of the smaller crusher. A Koehring gasoline shovel and an Armstrong all-steel well drill suffered little damage. A Climax gasoline engine driving an electric lighting plant near the primary crusher was damaged to some extent.

The total loss to plant and equipment was estimated at $20,000.

A peculiar incident was that one stone tore a 2-ft. hole in the 10-in. concrete and steel deck of a bridge located about 150 yd. from the quarry face. Traffic on this road was stopped before the shot was fired, and after the dust of the explosion had settled, traffic had been signalled to proceed when this stone crashed through the floor of the bridge.

## Chairman of Marble Cliff Quarries an Automobile Tourist De Luxe

JOHN W. KAUFMAN of Columbus, Ohio, has made so many automobile tours of this country and Canada, adding each time to his equipment, that this year his outfit came to more than $25,000. Early this year be bought a six-cylinder White bus chassis and in addition a truck for baggage. On the chassis the Bender Body Co. is building living quarters with folding beds, shower bath, radio, electric kitchen and electric refrigeration. The range gets its electricity from the generator.

Mr. Kaufman is chairman of the board of directors of the Marble Cliff Quarries Co., Arrow Sand and Gravel Co. and the Ohio Steel Foundries Co. It is his pleasant habit to get together five or six of his brother Elks and take them for a three-months trip to the Pacific coast, all expenses paid. They usually carry supplies for several weeks, as they travel across country without much touch with so-called civilization.

In a 100-page book about their 1925 trip, one of his companions describes Mr. Kaufman: "A character of unusual forcefulness, willing to act and serve, quick to grasp any situation, compassionate, ever ready to forgive, fearless in the face of danger, with grit and stamina enough for a dozen men, kindly, chivalrous, hospitable, John Kaufman is all the traditional southern hospitality rolled into one composite character, standing apart from the world."—*Cleveland* (Ohio) *Plain Dealer*.

***How a blast wrecked an Iowa crushing plant***

**Remains of the screening plant after "too much" blast**

## Southern Lime Products Co. Plant Nears Completion

A LIMESTONE PLANT producing from 25 to 50 carloads of limestone a day will be placed in operation on the Armstrong Place, in Crisp county, Georgia, about ten miles southwest of Cordele, by the Southern Lime Products Co., within the next sixty day, according to announcement made recently.

The plant will be on a four-mile spur line connecting with the Georgia Southwestern and Gulf railroad, which is now in the process of construction.

Both the line and the plant will be completed in about sixty days, unless inclement weather prevents.

The plant, representing a total investment of $200,000, will employ about 50 men, will be almost completely operated by electrically-driven machinery, and will be operated by the Southern Lime Products Co., of Cordele. W. K. Snellgrove, of Cordele, will be in charge.—*Noultrie* (Ga.) *Observer.*

The history of how the plant came into being is an interesting one. About the middle of last January, Clay M. Snyder, prospecting for the Southern Lime Products Co., came to Albany. He first visited Limestone Bluff, on the Flint River in Lee county, and prospected that deposit. He found the overburden too heavy for successful working and abandoned the location and came back to Albany. He then prospected the land on Muckalee creek. Excellent deposits were found near enough the surface to be worked, and it appeared that a plant would be located there. Further checking, however, developed the fact that this land is honeycombed with underground streams, rendering successful mining doubtful.

Then began a long hunt to find where the Limestone Bluff strata crossed the Georgia, Southwestern and Gulf railroad, as it is well known that all of southwest Georgia is underlaid with limestone. The lands from the Ball Place straight through to Cordele and beyond were systematically drilled and the lands in Lee county (Limestone Bluff) redrilled in an endeavor to work out some plan that would enable this deposit to be worked.

Finally, after 2,000 holes along the G. S. W. & G. had been drilled, Mr. Snyder chose the present site in Crisp county. Negotiations were opened with the owner and about the latter part of April Mr. Snyder secured an option on 1,000 acres of the estate. An operation of 100 acres was staked out and systematic prospecting began, a hole being bored in every 100 sq. ft. of land. Lime was found in the entire area at satisfactory working depth.

It then became necessary for the Southern Lime Products Co. to secure a right-of-way so that four miles of spur track to the projected plant, from a point on the Georgia, Southwestern and Gulf railroad, just south of Raines, Ga., could be built. Many difficulties in securing right-of-way and in having surveys made were encountered, but these were overcome and construction began. —*Albany* (Ga.) *Herald.*

## New South Carolina Quarry Merger

THE Palmetto Quarries of Columbia, S. C., and the Capital Granite Co. of Blairs, S. C., have merged, forming the South Carolina Granite Corp. in a deal involving capital in excess of $750,000. George D. Lott of Columbia is president and general manager of the new concern, headquarters of which will be in Columbia. The merger formed one of the largest crushed stone corporations in the entire south.

The Palmetto quarries company was organized in 1916, and Mr. Lott has been actively engaged and in charge of it since it began operation. During the 12 years of its existence as a corporation it has grown to the point where it is one of the largest quarries in the southeast.

The Capital Granite Co. is a comparatively new concern and was started by the Robert G. Lassiter interests of North Carolina. It has been producing steadily in recent months and has grown to about a par with the Palmetto quarry, which is located on the Columbia side of the Congaree river.

According to the management, the purpose of the merger was to reduce overhead expenses as much as possible and to eliminate cross freight hauls, causing freight expenses to mount to a high figure. The new company wishes to reduce to a minimum the cost of production, and by doing these things, to be in a position to aid the highway department of South Carolina in building better roads for less money.

The two quarries are now producing an average of about 60 cars of stone per day, and the rate of production can be increased in proportion to the demand. The merger will mean a greatly increased sale of stone, in all probability, and the joint corporation expects to increase production steadily.

## New Oregon Sand and Gravel Plant

PLANS for development of an extensive deposit of clean, sharp sand and gravel along the Deschutes river just east of Tumalo, Ore., were announced recently by L. E. Corbin, contractor, Bend, Ore. A series of tests conducted by the Portland Cement Association has proved the Tumalo sand to be of a superior type, fit for use in the finest concrete work.

Mr. Corbin plans to install a screening plant, bunkers, a washing plant and crusher immediately. A drag line scraper will be used in handling the sand and gravel, Mr. Corbin said, and work will be started immediately.

Strength tests made by the cement association in comparison with a standard sand rated at 100 showed five samples of the Tumalo sand averaged 132. The lowest rating found after the usual 28-day curing period was 117 and the highest 165. On grading for size, the Tumalo deposit was very close to standard specified gradation, as close as any natural sand can be expected.

The deposit runs from 40% to 60% of oversize material, necessitating crushing. Samples taken from nearly 20 test holes were used in the tests, the average depth of gravel being estimated at 12 ft. Mr. Corbin's site for development includes about seven acres of land, although the deposit extends throughout the entire Tumalo basin, County Engineer Robert B. Gould stated.

The deposit is large enough to guarantee a continuous supply of first class sand and gravel, which will be an important factor in building operations in Bend, Mr. Gould pointed out. In the past, some sand has been shipped in for fine concrete work, making a very expensive product. Absence of organic matter and coating on the Tumalo gravel will yield a grade of concrete having the strength requisite for all purposes to which standard concrete can be put, Mr. Gould stated.—*Bend* (Ore.) *Bulletin.*

## Oldest American Limestone

A BLOCK OF ALTYN LIMESTONE, the oldest and earliest of the earth's sedimentary rocks, has been sent from Glacier National park to Springfield, Ill., to be used as the first or base stone of a series of blocks, representing the various strata of the earth's surface, in the new Illinois state museum building now in process of construction. The stone is sent at the request of Dr. A. R. Cook, curator of the museum.

Nearly 50 specimens have been received at Springfield for the construction of a column. This column will rest on the bedding plane of Altyn limestone, the first of the Algonkian series, in natural position. The others will be placed in the order of their occurrence or deposition.

This stone, whose age is variously estimated by geologists from 200,000,000 to 120,000,000 years, when placed in its proper position with relation to stones of other and later deposits, will be the basal rock of the column presenting to the eye of the museum visitor the entire story of the earth's rock history from the igneous rocks to the present.

Altyn limestone has a bluish cast when fresh, weathers to yellow, is very hard and firm and varies from a few feet to 1,600 ft. in thickness in the park. It shows prominently on nearly all of the mountains rising abruptly from the plain, forms many of the park cliffs makes the abrupt and blunt summit of Chief mountain and the extensive top ridges of Yellow mountain. — *Anaconda* (Mont.) *Standard.*

## W. A. Fay

W. A. FAY, nationally known in the building industry, through his efforts, covering a span of over 25 years, as an organizer, trade association manager, material dealer, manufacturer and general contractor, died June 10 at his home in Los Angeles, Calif., where he had but recently transferred his residence in anticipation of continuing his activities in a field which seemed to offer

*W. A. Fay*

a maximum of opportunity and in which he needed no introduction.

Mr. Fay's record of unfailing achievement in his chosen sphere was at once a source of pride to his friends and an inspiration to his associates and co-workers. Coming into the supply trade in June, 1903, when he was selected by the Mason Contractors' Association of the Builders' Exchange of Cleveland, Ohio, to serve as its executive secretary, Mr. Fay thereafter was continuously an important factor in organization work in the exchange. In order he formed the Carpenter Contractors' Association, the Cut Stone Contractors' Association, the Plaster Contractors' Association and the employment bureau of the exchange. Under his direction this bureau subsequently proved to be of untold value in co-ordinating efforts of employer and employe.

In 1906, Mr. Fay organized from the Mason Contractors' Association the Masons' Supply Co., dealing in building supplies of all kinds. This company was later merged with the Kelley Island Lime and Transport Co. and bought out the Cleveland Builders Supply Co., continuing the business under the latter name. Upon the expiration of his contract and service as general manager of that firm, Mr. Fay served as general manager of the Lake Erie Builders' Supply Co., after which he organized the Cuyahoga Builders' Supply Co., purchasing outright the business of the Cleveland and Pittsburgh Coal Co. Under the direction of Mr. Fay, as president and general manager, the Cuyahoga Builders' Supply Co. grew to a position of importance in Cleveland, distributing practically every kind of material entering into a building with the exception of lumber. Many exclusive lines were handled and in addition to his other duties, Mr. Fay was designated as Cleveland sales manager by the Huron Portland Cement Co. and the Wyandotte Portland Cement Co.

In 1920, in line with the post-war demands for consolidation, Mr. Fay effected the sale of the Cuyahoga Builders' Supply Co. to the Cleveland Builders' Supply and Brick Co., retaining a very substantial stock interest in the merger.

In the summer of 1922, Mr. Fay made a careful survey of conditions on the Pacific coast, which was to lead to his ultimate location there. Returning east, he went to Detroit, Mich., organizing the Delta Brick and Tile Manufacturing Co. and personally operating the company until 1925, when he sold out to the United Fuel and Supply Co. In December of the same year he went to Florida and in March following associated himself with Frank T. Andrews of Cleveland, where they conducted a general contracting business under the firm name of the Andrews-Fay Construction Co. During the succeeding year and a half they executed contracts representing an aggregate total of $1,250,000.

In April, 1928, Mr. Fay closed up his affairs in Cleveland and elsewhere in order to realize his long cherished ambition to locate permanently in California.

With all his untiring efforts in his work, Mr. Fay found ample time for play and social activities and for service to his country, having been one of the first to volunteer at the outbreak of the Spanish-American war and later served as first commander of the Major Cramer Command No. 6, in recognition of which he was accorded an impressive military funeral by the Spanish War Veterans.

In all of his activities, Mr. Fay maintained consistently a high standard of efficiency and fair play. His marked ability, combined with a genial and kindly disposition, made him universally loved and his passing comes as a personal loss to a host of friends and associates from coast to coast.

In addition to Mrs. Fay (Elizabeth B.), other members of the immediate family consist of a daughter, Frances C. Fay; a sister, Mrs. Ernest J. Kolath of Los Angeles, and two brothers, Joseph F. Fay of Cleveland and Tom Fay.

## John W. Boardman

JOHN W. BOARDMAN, a figure of national prominence in the portland cement industry, died early Friday morning, August 3, at Mercy hospital, Jackson, Mich., following a serious operation about 10 days previous. At the time of his passing he was vice-president of the Huron Portland Cement Co. of Detroit, Mich.

Mr. Boardman's entire business life was spent in the portland cement industry. He started in 1904 under his father, John W. Boardman, Sr., with the Southern States Portland Cement Co., Rockmart, Ga., a branch of the Cowham System. From that time he continued with the Cowham System until 1914, when he accepted a position as sales manager of the Huron Portland Cement Co. He was later promoted to the position of vice-president and general sales manager of the company, which position he held at the time of his death.

For the past six years Mr. Boardman has been treasurer of the Portland Cement Association, a national organization supported by

*John W. Boardman*

the portland cement manufacturers of the country, engaged in the promotion of concrete as a building material. Throughout his professional career he has taken active interest in national portland cement affairs. He was one of a committee from America in attendance at the unveiling of the monument to Joseph Aspdin in England in 1924. This event commemorated the 100th anniversary since the patenting of portland cement in 1824 by Joseph Aspdin.

At the time of his death Mr. Boardman was 43 years old. Although he had maintained his office in Detroit with the Huron Portland Cement Co., he nevertheless retained his home residence on the Clinton road, Jackson, Mich., where his family lived. Surviving are the widow and three children

—Edward, 18; Anita, 16, and Joan, 2; a brother, Harry D. Boardman, and a sister, Mrs. Roland B. Walker.

In addition to his affiliation and national prominence in the cement industry, Mr. Boardman was a member of the board of directors of the Michigan Manufacturers Association, and belonged to numerous clubs, among them being the Detroit Athletic Club, the Detroit Club, the Jackson Lodge of Elks, the Union League Club of Chicago and the Jackson City Club of Jackson, Mich.

The funeral took place at St. John's church on August 6, followed by burial in St. John's cemetery, Jackson. Active pallbearers were George E. Warren, Hal H. Smith, Walter S. Wilson, P. B. Loomis, A. A. Spaulding and R. W. Smith. Mr. Boardman's funeral was largely attended by prominent business and professional men associated with him throughout his business career.

## Cement Now One of Buffalo's Biggest Industries

AT THE CLOSE OF THE FIRST YEAR of full production, Buffalo cement plants are producing approximately 3,000,000 bbl. of cement annually and are consuming well over 200,000,000 kw. of electricity produced by the Buffalo, Niagara and Eastern power system.

Great Lakes Portland Cement Co., which sells its entire production through Lehigh Portland Cement Co., and Federal Portland Cement Co., connected with the Buffalo Slag Co. and the Standard Slag Co., opened their plants in May and June, 1927, and attained full production by the latter part of the summer.

These plants are rapidly supplying the 1,000,000-bbl. annual demand of Buffalo and vicinity and the 1,500,000-bbl. demand of Erie county, although there is still a great deal of competition from outside firms.

Largest part of locally produced cement is now shipped outside the immediate vicinity to points in northern Pennslyvania, eastern Ohio and New York, outside New York City.

The Great Lakes Cement Co. is now constructing a packing and storage plant with 125,000-bbl. capacity at Cleveland, whence cement produced here will be shipped in bulk by boat to be sacked and sold in the Ohio territory.

By lowering freight charges between Buffalo and Cleveland the company can sell more cheaply, and it is expected sales will increase in that section. To provide shipping facilities at the Buffalo plant, new storage bins and docks are being constructed on the lake shore adjacent to the plant.

The company increased normal production this year by operating at half capacity during the entire winter when cement plants are ordinarily closed. In this way large supplies of clinker, the product obtained by burning the raw materials in the kiln, were piled up ready to be crushed for summer demand.

June to October are the large months in the cement industry. This year demand was poor in Buffalo during June because of rainy weather which delayed construction. July and August have been good and it is expected that the next two months will make 1928 a normal year, slightly above 1927.

At present the Great Lakes company, using 12,500,000 kw. of electricity, in a normal month, is the largest single user of power supplied by the Buffalo, Niagara and Eastern power system. The Federal, with half as many kilns of slightly smaller size, uses somewhat less than half this much power a month.

Of cement consumed in Buffalo, about 28% goes into highway construction, 25% into building and about 12% into cement products. The largest single piece of construction in the past year was the New York Central depot, which took about 100,000 bbl.—*Wall Street* (New York) *Journal.*

## Great Lakes Limestone Traffic Soon to Rival Coal

SHIPMENTS of limestone has become an important factor in lake transportation, and its approach to the coal-movement within a few years was forecast recently by G. Ashley Tomlinson of Cleveland, formerly of Duluth, one of the largest vessel owners and operators on the Great Lakes.

Use of limestone in the manufacture of steel and in the cement industry has made this product an important commodity in recent years, according to Mr. Tomlinson, while the valuable fields in Alpena, Mich., have stimulated the movement to points along the Great Lakes

In discussing lake traffic, Mr. Tomlinson pointed out that the ore movement is about the same as last year, when 54,000,000 tons were shipped, while less coal is being transported, and the total will run under the 30,000,000 tons of last year, ranging somewhere between 26,000,000 to 28,000,000.—*Duluth* (Minn.) *Herold.*

## New California Sand and Gravel Enterprise

BREAKING OF GROUND for the new plant of the Pacific Rock and Gravel Co. at Centerville, Calif., was started August 24. The work is being done with the aid of a locomotive crane brought from San Francisco, the 50-ft. boom of which required a special flat car for its transport.

The new plant is to cost between $200,000 and $250,000 and is expected to be one of the largest and best equipped in California. A siding next to the Southern Pacific railroad tracks in Centerville has been prepared in advance of the work of breaking ground.

The plant is located on a gravel deposit of 68 acres, high in sand content. It is expected to have a producing capacity of 1500 tons of gravel, sand and crushed rock in an 8-hour day, employing about 15 men.

Several Hayward business men are connected with the project financially. The organizer is Frank McHugh, of Loring and Frank, Inc., San Francisco.—*Hayward* (Calif.) *Review.*

## Florida Lime Products Co. Plant Nearing Completion

MOST of the buildings at the new operation of the Florida Lime Products Co., Florala, Ala., are now completed and ready for occupancy; and already being operated are a large and well furnished repair shop, test drills, and steam shovels. There is also a large force of carpenters now employed building residences with 4 or 6 completed or nearing completion.

The steam shovel, which is one of the newest and best designs now manufactured, is already on the job clearing away the surface and debris, a large area already being uncovered, leaving a beautiful surface of perfectly white limestone over the entire section without even a seam or pocket of earth.

This particular plot or section of the limestone with only a small section cleared of debris and surface growth ready for the crusher, has been tested by a well which is 3 or 4 ft. in diameter and 35 to ft. in depth, which shows the same rock formation the entire depth.

This section, or bed, which will be mined first is also about 200 yd. long by 500 yd. wide and contains enough material to keep the crusher running for a year or more, at a capacity of 200 tons per day.

Crushing machinery, according to plans of the management will be installed during the present month. When completed, the rock will be mined from the pit and conveyed by belt to the crusher thence by conveyor belt to railway cars.—*Florala* (Ala.) *News.*

## Canada Exempts Municipal Rock and Gravel Producers from Sales Tax

EXEMPTION from sales tax of certain materials produced and used by municipalities for the building or maintaining of roads was announced recently by the Department of National Revenue of Canada. The order-in-council providing for the exemption reads, in part, as follows:

"That crushed stone, produced or manufactured by any municipality exclusively for use in building or maintaining roads or sidewalks, and not for sale, and sand, gravel, rubble and field stone, be exempt from sales taxes, and, further, that the said tax be remitted in respect to these commodities heretofore produced by municipalities and used for the construction or maintenance of municipal roads and sidewalks."

# Detroit's Sand and Gravel Industry Gets Recognition

A FINE EXAMPLE of helpful publicity for the commercial sand and gravel industry is a story in the *Detroit* (Mich.) *Free Press* of August 27 under the caption "Sand Gravel Industry Assumes Major Role in Detroit's Advance." The following are extracts:

"Sand and gravel, little thought of as the basic foundation of this city and all points of communication leading into Detroit, nevertheless is one of the important industries of present-day American business, it was poined out Saturday by the Detroit Convention and Tourist Bureau. Today Detroit holds second place among the consumers of this commodity and each year the city uses more than $30,000,000 of sand and gravel products.

"Its history dates back approximately 50 years, or to 1873, when the C. H. Little Co. shipped into Detroit, by the steam freighter *Mary*, the city's first load of sand and gravel and opened the way for a period of building and construction of skyscrapers, homes, roads, bridges, tunnels, sidewalks, railroads and other projects that have in the last 25 years advanced Detroit to a leading position as one of America's largest and most active industrial cities.

***Keeps Progress with City***

"As the years progressed, so did Detroit, and greater became the demand for sand and gravel for use in the erection of typical buildings of the period that were later to give way for the construction of magnificent structures which make this city what it is today, a center of towering giants which command the respect of all who view them.

"Coincident with the introduction of the automobile, dirt roads gave way to gravel, and gravel finally surrendered to the long ribbons of concrete highways that lead into Detroit from every point of the compass. Hundreds of thousands of tons of sand and gravel are used annually by the Wayne county board of road commissioners in the repair of old roads and the construction of new. The modern roadbed is of crushed rock, a product of the sand and gravel industry, and heavy gravel. Then comes the thick layer of surface concrete of a slightly finer grade, and finally the last layer of finish concrete, with a base of the finest grade of sand. As the dirt roads disappeared, so have the old creosote paving blocks been replaced by the much smoother concrete and asphalt pavements.

***Now 28 Firms in Detroit***

"In Detroit today there are 28 building and supply houses, which represent a total investment of approximately $30,000,000. These organizations supply the city with more than 15,000,000 tons of sand, gravel and stone annually. Through these outlets, contractors, constructors, structural engineers and road builders receive more than 200,000 carloads of this material, which, when mixed with cement, fortifies and beautifies the city, makes travel more comfortable and pleasant, and gives permanency to Detroit's buildings, roads and homes.

"The construction of the new Detroit-Windsor tunnel is an example of the importance of sand and gravel in the development of present-day projects. The steel tube linking the United States and Canada is heavily reinforced by concrete, using as a base more than 60,000 yd. of gravel and representing an expenditure in excess of $100,000. Still more of this product will be used in the construction of the roadway, which will accommodate five separate lines of traffic.

"Sand and gravel also play a major part in the erection of the new Ambassador international bridge, which will connect Detroit with Canada. All of the piers supporting the huge steel towers from which the bridge will be suspended are of solid concrete, which represents the usage of more than 20,000 yd. of sand and gravel, with an estimated cost of $40,000.

***Radical Advance Made***

"The production of prepared sand and gravel has become an engineering and manufacturing enterprise, a radical advance from the roadside pit from which it emanated. The demand for better highways and the advancement of structural engineering represented in the building of bridges and skyscrapers has resulted in rigid specifications as to materials to be used.

"Practically every form of transportation is used in the conveyance of this material from its source to the point of distribution. Large lake freighters, plying their way to the waters of north Michigan; motor trucks and trains boring into the interior of the state, return to deposit their loads in the yards of Detroit dealers.

"Early in the history of the industry there were no pits. It was not until about the year 1908 that the Detroit-Oxford Gravel and Stone Co. first opened a pit and started a "bank run" business, shipping its product by rail to its destination.

"Since then Michigan has rapidly developed sand and gravel pits, and now, located only a few miles distant from Detroit, Oxford has 15 pits and is the largest shipping center of sand and gravel in the world. Other pits are situated within close proximity to this city, and carried on in surrounding territory is a business that places Detroit and Michigan well in the forefront among the leading sand and gravel producing states of the nation."

## One California Community Proud of Its Gravel Industry

AMONG the concerns of Washington township which are carrying to the four corners of the globe the message that Niles and vicinity is to be one of the manufacturing centers of the West is the Niles Sand, Gravel and Rock Co., now owned by the Associated Gravel Co. The products of this organization have advertised the local community throughout the world by the reputation its materials have gained and which varieties are known as "Niles Gravel," "Niles Top Sand" and "Niles Crushed Gravel."

The company was incorporated in August, 1911, the construction of the plant being commenced immediately and completed in time to begin operations in July, 1912.

W. H. Ford, a resident of the township since 1886, and Howard C. Plummer, a well known and highly regarded citizen of the community, financed the organization, most of the stock being owned by Mr. Ford.

Mr. Plummer went to Chicago to take up with officials of the J. C. Buckbee Co., engineers, arrangements for furnishing plans and specifications for the first modern electrically equipped plant for producing washed, crushed and properly screened sizes of rock, sand and gravel for construction work.

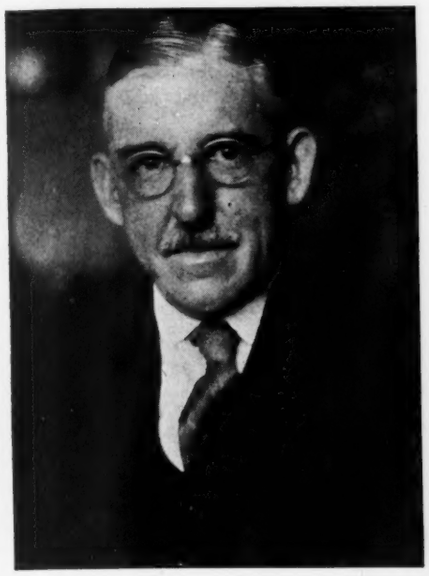
It was a tedious, slow, uphill fight for recognition at that time, as the company had to overcome the prejudice of engineers and contractors against the poorly washed and poorly segregated materials that has been theretofore produced, but with modern methods as introduced by the Niles Sand, Gravel and Rock Co., success finally crowned the efforts and won favor with very few exceptions by the engineers and contractors throughout central California.

The business and financial side of the organization was managed by Mr. Ford from an office in San Francisco, with Mr. Plummer remaining in charge of plant production work at Niles. In this manner the concern operated continuously from the time it began in 1912. It distributes in Alameda county approximately $300,000 annually, of which about $150,000 is paid the railroad company for freight charges.

From 25 to 35 men are employed constantly, depending upon whether the plant operates one shift or two shifts per day. Most of these men have families and homes in and near Niles and a large number of them have been with the company since its beginning. Officials state that this is the only company in the community which has operated full time in season and out of season, year in and year out, since its beginning 16 years ago.—*Niles* (Calif.) *Register*.

## Edmund Shaw Takes Leave of Absence

EDMUND SHAW, who has been one of the editors of ROCK PRODUCTS since 1923, and who has many friends and acquaintances in the rock products industry, is taking a leave of absence from his routine duties to recuperate from a severe illness which has kept him from his work since the latter part of June. He will make his home



***Edmund Shaw***

in Los Angeles, Calif., for several months at least. He remains, of course, a member of ROCK PRODUCTS' editorial staff and will contribute special articles and expert advice on the industries he is most particularly familiar with. He will also be a staff representative of ROCK PRODUCTS on the coast, and eventually will undoubtedly be able to travel about among the plants there as he has done, the country over, in times past.

## National Gypsum Company's Vice-President Foresees More Business

ANNOUNCING a 10% advance in building business the last year, increased production and a $500,000 plant extension, M. H. Baker, vice-president of the National Gypsum Co., anticipated an even greater measure of prosperity during 1929 when he addressed a semi-annual conference of the company's western New York and Canadian salesmen on September 1.

Mr. Baker said the general outlook for increased business next year is encouraging and to meet it the company is augmenting its sales force, increasing its advertising expenditures and adding to its line of products. Among the latter is a new 5/8-in. gypsum slab that has three times the insulative value of lath and plaster.

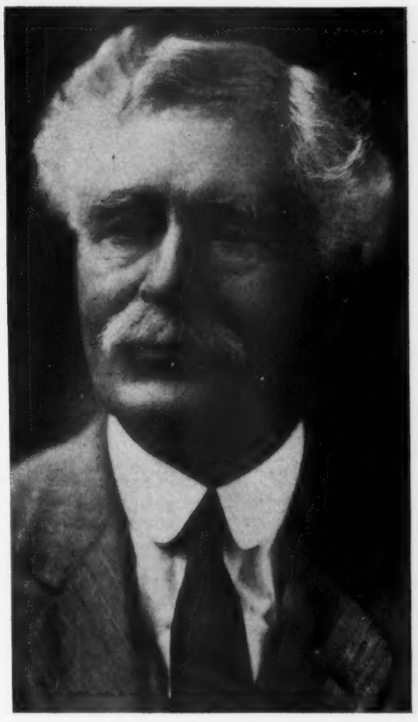
In the past two years, Mr. Baker said, the National Gypsum Co., with 2500 of its shareholders in Buffalo, N. Y., has jumped from 10th to third position in the gypsum industry.

Other speakers at this session included Dean D. Crandall, Buffalo, in charge of the company's research and quality control department.—*Buffalo* (N. Y.) *Times.*

## Joseph Andrew Jeffrey

JOSEPH ANDREW JEFFREY, chairman of the board of directors and founder of the Jeffrey Manufacturing Co., Columbus, Ohio, banker and business man, died at his home in Columbus, August 27, at the age of 92 years.

Mr. Jeffrey was born at Clarksville, Clinton county, Ohio, January 17, 1836. He was the son of James Jeffrey, a native of Monmouth county, N. J., and Angeline (Robinson) Jeffrey, daughter of David Robinson, one of the pioneer settlers of Warren county, Ohio. He was educated



***Joseph Andrew Jeffrey***

in the public schools of Clinton and Auglaize counties, completeing the high school course in the latter.

In 1858, Mr. Jeffrey came to Columbus, where on August 21, 1858, he secured a position in the office of Rickley and Brother, private bankers. There he remained until 1863 in various positions as bookkeeper, teller and cashier, and then removed to Cincinnati, where he engaged in the wholesale and retail carpet and furnishing business until 1869 as a member of the firm of Rickley, Howell and Co., having a fourth interest in the firm.

He disposed of this interest after three years to J. J. Rickley and returned to Columbus, where, in connection with S. S. Rickley, then of the firm of Rickley and Brother, bankers, he organized and established the Commercial bank at High and Long streets, now the Commercial National bank.

A year later, Mr. Rickley sold his interest in the bank to Orange Johnson and F. C. Sessions, who, with Mr. Jeffrey, formed a partnership under the name of the Commercial bank, with Mr. Sessions as president and Mr. Jeffrey as cashier. He held that position until 1883, when he disposed of his interest to Mr. Sessions and acquired a controlling interest in the Lechner Machine Co. of Columbus.

Mr. Sessions became the president, but was succeeded by Mr. Jeffrey, who retired in 1900 to become chairman of the board of directors. The company has been known successively as the Lechner Mining Machine Co., the Lechner Manufacturing Co., and the Jeffrey Manufacturing Co.

In addition to Mr. Jeffrey's interest in the Jeffrey concern, he also was owner of the Ohio Malleable Iron Co.; a stockholder, vice-president and director of the Commercial National bank; a stockholder and director in the former Ohio Trust Co., and connected directly and indirectly with many other business enterprises of Columbus.

## Carl B. Wirsching

THE NEW EXECUTIVE ENGINEER of the Southern California Rock Products Association, Los Angeles, Calif., whose appointment was noted in a previous issue of ROCK PRODUCTS, is the gentleman you are looking at below. He is a former California state highway engineer.

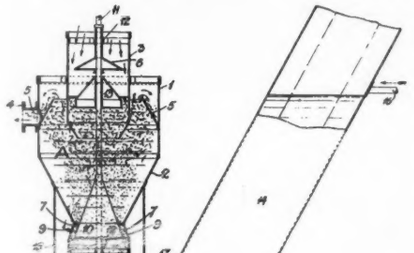
***Carl B. Wirsching***

# Foreign Abstracts and Patent Review

**The Influence of Different Kinds of Stemming on the Efficiency of Explosives.** Five different classes of explosives were tested by the Trauzl lead-block method to determine the relative efficiency of different stemming materials. Loam was found to be equivalent to cement and both of these materials better than water, sand or rock dust. The types of explosives tested included gelatine and kieselguhr dynamite (75%), ammonium nitrate, sodium chlorite and potassium chlorate explosives.—*Z. ges. Schiess-Sprengstoffw.* 22, 346-8 (1927).

**The Stehmann Process in the Rotary Kiln.** The rotary kiln receives about twice the amount of air in the sintering zone received by the automatic shaft kiln. This large quantity of excess air must be heated to sintering temperature with large additional quantities of fuel in order to prevent a drop in temperature in the kiln. Stehmann selected two ways to improve the heat balance: heating the minimum quantity of air and thus filling the space preceding the sintering zone, reducing the suction, and limiting necessarily the quantity of air to a minimum computed amount. A required condition in this connection is airtight discharge of clinker from the cooler. The kiln committee of the Association of German Portland Cement Manufacturers conducted tests of the Stehmann process and found a reduction in fuel consumption of 14.8%; however, a simultaneous reduction in output was established, due to faulty operation. Stehmann proceeded as follows: he built a stationary cooler under the discharge end of the kiln, and made it airtight at the clinker discharge. As the shaft cooler has lately been replaced by the cooling drum, the latter was adopted by sealing both ends and making the discharge airtight. The air required for combustion is blown through the cooler. Agitators are provided to bring the air in intimate contact with the clinker. Although the shaft cooler required an additional supply of power of 30.7 hp., no additional power is consumed by a kiln with cylindrical cooler. Surface cooling is considerably more effective than cooling in the shaft. Clinker leaves the drum at temperatures below 200 deg. C. A fixed quantity of air is established for a certain capacity and certain charge and is kept constant by strict control. A rationally selected and uniform proportion of the raw mix, the charge and the air is thus maintained in the sintering zone. With proper operation, the operator should watch the $CO_2$ and CO meters, as they indicate the ratio of coal to air. A drop in stack gas temperature indicates a larger supply wave of material moving through the kiln, so that stronger firing is required temporarily. These improvements in operation have resulted in a fuel reduction of 23-26% for the wet process without having their initial disadvantages. The power consumption remains the same and the clinker leaves the cooler at about 180 deg. C. The motto "Short sintering, quick cooling" has been realized by this process. The quality of the clinker presents no doubts. Thorough preheating of the charge permits the successful use of coal varieties low in gas.—*Tonindustrie-Zeitung* (1928), 421-423.

**Separation of Sand, Gravel and Like Substances From Earthy or Loamy Material.** The invention consists in an improved construction of apparatus comprising a container provided with a tubular inlet



***An improved separator for removing earthy material from gravel or sand***

member at its upper end for the admission of water containing the raw material, said inlet member extends downwardly into the container and contains a cone-shaped distributor for the material. Below the outlet of the tubular inlet member is an adjustable annular throat for the admission of an upwardly directed current of clean water and for the evacuation of the heavy particles which sink down through said current. This throat is formed by a cone mounted axially in the container, and is controlled automatically by means of a float or by hand. The container is provided with an annual overflow channel surrounding said inlet and operating to evacuate the water containing the lighter or smaller particles in suspension and a conveyor is connected with the container for removing the sand or the like. Further, between the bottom of the container and the casing containing the conveyor an adjustable baffle plate is arranged for preventing the sand overrunning the lower part of the conveyor. The materials are introduced into the apparatus carried by or suspended in a large volume of water which also serves to carry off the waste product or lighter substance. The separating apparatus is arranged so that the rate of flow of the initial and separating liquid can be maintained at not less than that required to maintain the waste product material—that is to say, the lighter particles in suspension—while the current of clean liquid provides a counter-current as referred to at the zone of separation. The annexed drawing shows the separating apparatus diagrammatically in vertical section and in combination with an elevator for removing the separated sand. (Four claims.)—*British Patent No. 282,169, granted to H. S. Field and J. H. Harrison.*

**The Identification of Blast Furnace Slag in Cements.** Dr. H. W. Souell of the National Testing Bureau at Berlin-Dahlen has found that hydraulic slags when heated with a solution of lead acetate, acidified with acetic acid, acquire a characteristic brown or black color. The phenomenon is easily observed by examining the granular particles under a microscope. Clinker from 15 cements examined in no case colored the same. This makes it possible to establish the presence of slag additions in cements by means of the lead acetate treatment. The method is qualitative and would be of practical value in the discovery of adulterations.—*Zement* (1928), 437-443.

**Methods of Determining Calcium Carbonate in Cement Mix.** The author discusses the value and practical usefulness of the two methods preferred for the determination of calcium carbonate in the raw mix. Titration with normal hydrochloric acid and back tritration was n/2 alkali is compared with the carbonic acid determination. The titrimetric process gave an average value of 17 determinations of 76.56%, while the calcimetric process resulted in 77.28%. The analytically determined $CaCO_3$ content was 76.11%; $MgCO_3$, 1.25%. The two processes thus give values higher by 0.45 and 1.17 respectively, this being caused by including the magnesia content. While formerly the opinion prevailed that the hydrochloric acid required for the solution of $MgCO_3$ during titration was balanced by the back titration, so that the phenolphtalein color appears only when all of the $MgCO_3$ is precipitated as $Mg(OH)_2$, it is now considered that, in spite of the low solubility of $Mg(OH)_2$, the solution of a base of the second group is colored red by phenolphthalein. The coloring appears before precipitation of $Mg(OH)_2$ takes place, so that magnesia is only partly included in the determination by titration. Titration of dolomites of known composition is a proof of this.

According to the tests, both methods are

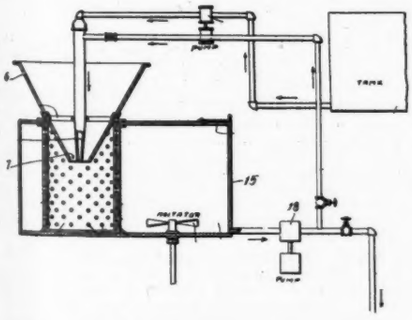
suitable for the determination, as we are less concerned with absolute values. A chemist recognizes easily variations of calcium carbonate content by the behavior of the raw mix during burning. Difficulty of burning and small clinker particles point to a too high carbonate content; ring formation in the kiln, to one that is too low. Normal clinker is of a black-grey, greenish or bluish color and has a certain opalescence, while low-lime clinker resembles slag and has a dull appearance. Such observations, however, give only an approximate idea of the carbonate content.—*Tonindustrie-Zeitung* (1928), 678.

## Recent Process Patents

*The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.*

**Method of Treating Prosphate Rock.** The process consists in calcining crude pebble phosphate rock to a sufficient high temperature to expel the moisture, carbon dioxide and organic matter and then mixing the hot, calcined rock with a predetermined proportion of wet, uncalcined rock. The two materials are kept in intimate relation during the interchange of heat between the hot rock and wet rock in a manner to cool the hot rock and dry the wet rock to provide a relatively cool, dry mixture containing carbon dioxide suitable for commercial purposes.—*George T. Harned, assignor, Phosphate Mining Co., U. S. Patent No.* 1,671,765.

**Method and Apparatus for Hydrating Cement.** The patent describes a method of mixing water with hydraulic cement or the like. The object is to provide means of mixing cement and water in a continuous manner and thus to form a pulp of uniform




***Apparatus for hydrating cement or similar substance***

consistency by re-circulating all or part of the mixture to the mixing compartment, where corrective steps can be made.

The apparatus consists of a funnel (6) for receiving the cement and a water jet (7) which, by suction, draws the material to the first mixing compartment which is provided with perforated outlets. This perforated cylinder sets inside of a larger tank (15) provided with an agitator to prevent settling. If the pulp is too thin, a part or all can be circulated back to the jet by the pump (18). —*Erle Palmer Hilliburton, U. S. Patent No.* 1,680,678.

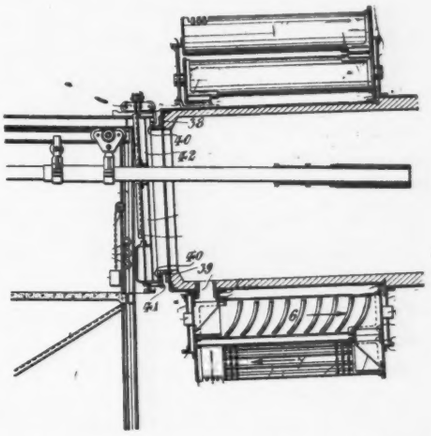
**Method of Manufacturing Cements Rich in Alumina.** While portland cements require a burning temperature of from 1400 to 1500 deg. C., the so-called aluminous cements, which are produced in electric smelting kilns or water jacketed kilns, require a considerably higher temperature, viz., about 1600 deg. C. The usual type of kiln is not suitable for this high temperature work, as the high alumina charge is very strongly adhering and the softening of the mass is continued by rapid streams of molten cement instead of clinker. Hence other types of kilns have to be used, which makes the manufacturing costs high.

It has been found that if 2 to 3% flourspar is added to the raw mix, the sintering temperatures are decreased. The inventor is aware of the use of flourspar in portland cement for the purpose of reducing the fusing point and points out that this introduces undesirable impurities in the clinker. However, if the alumina content of the clinker is kept high, these undesirable impurities do not form. The process then makes possible the manufacture of high alumina cements in the ordinary portland cement type kiln.—*Alexander Hasselbach, assignor to G. Polysius (Germany),* 1928, No. 1,677,182.

**Method of Producing Granules from Soft Non-Vitreous Rocks.** Rock granules are valuable for use for surfacing asphalt shingles, rolled asphalt roofing, wood fiber compositions, rubber and asbestos products. They find extensive use for decorative purposes and in most cases are applied as a dash to the unset cement base. It is known that asphalt when subjected to sunlight soon loses its strength and becomes chalky and disintegrates, so it has been the practice to coat shingles with a surfacing material that will protect the asphalt. Of the natural granules, slate is preferred, it being soft and of laminated structure. Quartz is not desirable on account of its hardness and cost of grinding and the grains not overlapping. which allows the asphalt to exude between the particles and stains the face of the shingle.

The inventor proposes to vitrify soft rocks, such as pyrophyllite, in a rotary kiln at temperatures from 1200 to 1400 deg. C., first grinding the rock to 10- to 35-mesh. The rocks he would use give a white, vitreous, laminated, non-absorptive granule. If it is desired to color the granules, he proposes to add fluxing agents, such as sodium borate, with oxides of iron, cobalt or chromium to give the desired tint. The colored granules can be fired at temperatures from 1110 to 1170 deg. C.—*William H. Alton, assignor to R. T. Vanderbilt Co., July* 17, 1928, No. 1,677,701.

**Improvements to Rotary Kiln Coolers.** The invention relates to several new features of rotary kilns of the general type and construction as shown by Letter of Patent, No. 1,653,050 and has for its purpose the improvement in construction and reduction of repairs to parts subject to clinker movement. An arrangement for closing the end of the kiln, the support of the cooling drums arranged around the periphery of the kiln,




***New design of rotary kiln which has many improved features***

and means for protecting those parts of the cooler drum that are subjected to wear are also covered in the patent.

To provide for closing the end of the kiln at all times regardless of the contraction or expansion, the shell of the kiln is provided with an inwardly extending flange (38) to which is secured a channeled annulus (39) which has an outwardly extending flange (40) which is machined for close contact with the outer face of an inwardly extending flange (41). This interlocking of the door with the face of the kiln insures a tight joint at all times, as the door is supported and is movable in the direction of the axis of the kiln to take care of any longitudinal expansion or contraction. The door is made in two parts which meet in a vertical line and are flanged for joining together. Means are also provided for preventing the door and its support from working out of place due to the kiln's rotation.

The discharge throat of the kiln to the inner cooler is provided with a flanged bushing. The clinker after leaving the kiln is prevented from falling back into this throat, on the upward movement of the kiln, by specially constructed baffles (6) in the inner cooling drum. The inner and outer cooling drums are fastened to the kiln proper by plates of sufficient flexibility to take care of any longitudinal expansion or contraction. As the kiln is at a higher temperature then the inner drum and, likewise, this drum is at a higher temperature than the one of the outer series, this flexible arrangement prevents the rupturing of the supporting means. —*U. S. Patent No.* 1,675,416 *to Povl T. Linhard, Assignor to F. L. Smidth & Co.*

# Traffic and Transportation

## Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

| | Limestone flux Week ended | | Sand, stone and gravel Week ended | |
|---|---|---|---|---|
| District | Aug. 11 | Aug. 18 | Aug. 11 | Aug. 18 |
| Eastern | 3,846 | 3,758 | 18,360 | 18,519 |
| Allegheny | 4,086 | 4,159 | 11,847 | 10,968 |
| Pocahontas | 640 | 610 | 850 | 883 |
| Southern | 718 | 744 | 11,796 | 11,147 |
| Northwestern | 1,835 | 2,015 | 9,399 | 9,869 |
| Central Western | 453 | 421 | 15,753 | 14,182 |
| Southwestern | 357 | 374 | 7,426 | 7,599 |
| Total | 11,935 | 12,081 | 75,431 | 73,167 |

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1927 AND 1928

| | Limestone Flux Period to Date | | Sand, Gravel and Stone Period to Date | |
|---|---|---|---|---|
| District | 1927 | 1928 | 1927 | 1928 |
| Eastern | 108,249 | 91,754 | 314,467 | 308,925 |
| Allegheny | 115,064 | 106,556 | 251,050 | 218,413 |
| Pocahontas | 16,394 | 14,731 | 29,194 | 25,912 |
| Southern | 18,426 | 18,448 | 393,536 | 341,122 |
| Northwestern | 44,348 | 42,623 | 221,377 | 199,251 |
| Central Western | 16,444 | 13,651 | 295,559 | 324,741 |
| Southwestern | 10,419 | 13,534 | 178,475 | 194,450 |
| Total | 329,344 | 301,297 | 1,683,658 | 1,612,814 |

COMPARATIVE TOTAL LOADINGS, 1927 AND 1928

| | 1927 | 1928 |
|---|---|---|
| *Limestone flux* | *329,344* | *301,297* |
| *Sand, stone, gravel* | *1,683,658* | *1,612,814* |

## Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning September 8:

### SOUTHERN FREIGHT ASSOCIATION DOCKET

41600. **Crushed and broken stone** from Tate and Whitestone, Ga., to Madison, Wis. It is proposed to publish a through rate of 523c per net ton on crushed and broken stone, carloads, from Tate and Whitestone, Ga., to Madison, Wis., to apply via usual available routes. This rate is now available via certain routes on basis of Chicago, Ill., combination.

41637. **Ground limestone** between points in southern territory. It is proposed to establish less than carload rates on agricultural ground limestone between points in Southern Freight Association territory the same as at present applicable on fertilizer, less than carload.

41644. **Sand** from Diamond, Fla., to Key West, Fla. Present rate, 3798c per car of 36,000 lb., excess in proportion. Proposed rate on sand, N.O.S., carloads, 3618c per car of 36,000 lb., excess in proportion, same as the present rate from North Diamond, Fla.

41673. **Gravel**, carloads, from Dragon, Miss., to Laurel, Miss. In lieu of present rate of 80c per net ton, it is proposed to establish commodity rate of 68c per net ton on gravel, straight carloads, minimum weight will be 10% less than marked capacity of car, except when car is loaded to visible capacity, in which case actual weight will apply, or **gravel and sand**, mixed carloads, minimum weight 40,000 lb., from Dragon, Miss., to Laurel, Miss., made same as in effect from Hattiesburg, Miss.

41691. **Sand**, carloads, from Vandalia, Ill. (from beyond), to New Orleans, La. It is proposed to establish proportional rate of $3.10 per net ton on sand, carloads (See Note 1), from Vandalia, Ill., to New Orleans, La., applicable on traffic originating beyond Vandalia, made same as rate in effect from Rockport and Sandale, Ind.

41701. **Ground or crushed limestone**, carloads, from Franklin, Tenn., to Otey, Tenn. In lieu of Class N rate of 160c per net ton it is proposed to establish commodity rate of 90c per net ton on stone, agricultural (ground or crushed limestone), carloads, minimum weight 60,000 lb. Note: When loaded in box cars the equipment must be lined with strong paper to prevent loss, from and to points named above. Proposed rate made same as in effect to Siglo and Ashwood, Tenn., stations on either side of Otey, Tenn.

**Note 1—Minimum weight marked capacity of car.**
**Note 2—Minimum weight 90% of marked capacity of car.**
**Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.**

41739. **Silica**, from Apison, Tenn., to New Castle, Penn. It is proposed to revise present rate of 503c per net ton on silica sandstone and clay mixture), ground or pulverized, in bags, carloads, minimum weight 60,000 lb., from Apison, Tenn., to New Castle, Penn., to 598c per net ton, made on basis of Ohio River combination using proportions of lines to and beyond the river.

41753. **Stone**, from Tyrone, Ky., to Georgetown, Ky. It is proposed to establish reduced rate of 50c per net ton on stone, rubble, stone, broken, stone, in straight or mixed carloads (See Note 3) from and to points named above, made same as in effect from Frankfort, Ky.

41768. **Sand**, from Vandalia, Ill., to Birmingham, Ala. It is proposed to establish proportional commodity rate of $2.60 per net ton on sand, carloads (See Note 1), from Vandalia, Ill. (applicable on shipments originating beyond Vandalia), to Birmingham, Ala., made 50c per ton less than proportional rate suggested to New Orleans, La., under Submittal 41691.

41786. **Sand and gravel**, from Tallahatchie and Buxton, Miss., to N. C. & St. L. Ry. stations in Tennessee. It is proposed to establish commodity rates on sand and gravel, carloads in straight or mixed carloads (See Note 3), from and to points named above made on basis of the I. C. C. Docket 17517 scale. Statement of proposed rates will be furnished upon request.

### TRUNK LINE ASSOCIATION DOCKET

19476. **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads, also **gravel**, carloads (See Note 2), from Lewes, Del., to

| | Prop. | | Prop. |
|---|---|---|---|
| Newark, Del. | 140 | Delmar, Del. | 125 |
| Oxford, Md. | 160 | Salisbury, Md. | 125 |
| Cambridge, Md. | 140 | Crisfield, Md. | 160 |
| Seaford, Md. | 115 | Pocomoke, Md. | 150 |
| Easton, Md. | *150 | Makemie Park, Va. | 160 |

*To apply on gravel only.

The above rates in cents per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

19484. **Sand**, other than blast, engine, foundry, molding, glass, silica, quartz or silex, carloads (See Note 2), from Morrisville, Penn., to West Chester, Penn., 90c per ton of 2000 lb. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

19494. **Crushed stone**, carloads (See Note 2), from White Haven and Tannery, Penn., to Derringer, Penn., 95c per ton of 2000 lb. Reason—Proposed rates compare favorably with rates now in force from White Haven and Tannery, Penn., to Hazleton, Penn., and from Wyoming, Penn., to Mud Run and Laceyville, Penn.

19523. **Sand** (other than blast, engine, foundry, glass, molding or silica) and **gravel**, carloads (See Note 2), from Newburgh, N. Y., to Florida, N. Y., 80c per ton of 2000 lb. Reason—Proposed rates are comparable with rates now in force from and to points in same general territory.

19524. **Sand and gravel**, carloads (See Note 2), from Kenvil, N. J., to Allentown, Penn., 95c per ton of 2000 lb. Reason—Proposed rates are comparable with rates now in force from Carpentersville, N. J., to Allentown, Penn.

19525. **Crushed stone, sand** (other than blast, engine, foundry, **glass**, molding or silica) and **gravel**, carloads (See Note 2), from Otisville, N.Y., to Florida, N. Y., 80c per ton of 2000 lb. Reason—Proposed rates are fairly comparable with rates on like commodities from and to points in same general territory.

19535. **Sand** (other than blast, engine, fire, foundry, glass, molding, quartz, silex or silica), carloads (See Note 2), from Morrisville and Tullytown, Penn., to *Mantoloking, Lavalette, Ortley, Seaside Heights, N. J., $1.05 per ton of 2000 lb. *To apply only from Morrisville, Penn. Reason—Proposed rates are comparable with rates now in force from and to points in the same general territory.

19539. **Stone** (other than bituminous asphalt rock), **crushed**, N. O. I. B. N. in O. C., carloads, (See Note 2), from Jordanville, N. Y.

| To— | Prop. rate |
|---|---|
| Minnehaha to Big Moose | $1.30 |
| Woods to Keepawa | 1.40 |
| Partlow to Childwold | 1.50 |
| Piercefield | 1.60 |
| Tupper Lake Junction | 1.60 |
| Tupper Lake | 1.60 |

Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

19543. **Crushed stone**, carloads (See Note 2), from Rock Hill, Penn., to Philadelphia, Penn., $1.40 per ton of 2000 lb. Reason—Proposed rates are comparable with rates now in force on like commodities from and to points in the same general territory.

19546. **Limestone, ground or pulverized, and limestone dust**, carloads, minimum weight 50,000 lb., from East Buffalo, N. Y., to Black Rock, N. Y., inclusive. Rates in cents per 2000 lb.

| To— | |
|---|---|
| Willards to Brisben, N. Y., incl. | 180 |
| Coventry-Norwich, N. Y., incl. | 190 |
| Galena and Sherburne, N. Y. | 200 |
| Earlville to Waterville, N. Y., incl. | 210 |
| Paris to Bridgewater, N. Y., incl. | 220 |
| Unadilla Forks to Richfield Springs, N. Y., incl. | 230 |
| Clayville, N. Y. | 220 |
| Sauquoit to Utica, N. Y., incl. | 230 |

Reason—Proposed rates are comparable with the rates now in force from Buffalo, N. Y., to points in the same general territory as above destination points.

19550. **Molding sand**, carloads (See Note 2), from Albany district sand stations to Blairsville, Penn., Index 4615 and intermediate stations taking index numbers 2000 to 2010, 2260 to 2280, 2333, 2341 to 2352, 3503, 3522 to 3530, 3542, 3564 to 3567, 3576 to 3579, 3671 to 3680, 3700 to 3702, 3705 to 3711 and 8586 to 8592 incl., as outlined in D. & H. Co. I. C. C. No. 13582. Reason—Proposed rates are comparable with rates now in force to Pittsburgh, Penn.

19555. To cancel from P. R. R. G. O. I. C. C. No. 13794 commodity rate of 40c plus $6.30 per car (rate for delivery to site of new L. V. R. R. freight and passenger station at Easton) on **sand**, other than blast, **engine**, etc., and **gravel**, carloads, from Carpenterville, N. J., to Easton, Penn. Reason—Investigation develops rate above has served its purpose and is therefore obsolete.

### NEW ENGLAND FREIGHT ASSOCIATION DOCKET

15229. **Stone, broken or crushed**, in open cars in bulk, carloads (See Note 2), from Westfield, Mass., to Stamfordville, N. Y., $1.15 per ton (rate to expire December 31, 1929, unless sooner can-

celed, changed or extended). Reason—To meet competitive conditions.

15259. **Stone, broken or crushed** (See Note 2), from Westfield, Mass., to North Hoosic, N. Y., $1.60 per net ton via Northampton, Mass., and B. & M. R. R. Reason—To provide a rate that will compete with local stone.

### CENTRAL FREIGHT ASSOCIATION DOCKET

19287. To establish on **sand and gravel**, carloads, from Dundee, Ind., to Pleasant Mills, Ind., via N. Y. C. & St. L. R. R., rate of 95c per net ton. Present rate, sixth class.

19288. To establish on **sand and gravel**, carloads, from Troy, O., to stations in Ohio on the B. & O. R. R., rates as shown in exhibit A attached. Present rates, as shown in exhibit A, attached.

EXHIBIT A

(Rates in cents per net ton)

| To | Prop. | From Troy, O. Present | From Dayton, O. Present |
|---|---|---|---|
| Deshler, O. | 80 | *90 | 90 |
| Cairo, O. | 70 | *80 | 80 |
| Lima, O. | 60 | *70 | 70 |
| Cridersville, O. | 60 | *70 | 70 |
| Wapakoneta, O. | 60 | *70 | 70 |
| Botkins, O. | 60 | *70 | 70 |
| Anna, O. | 60 | *70 | 70 |
| Swanders, O. | 60 | *70 | 70 |
| Sidney, O. | 60 | *70 | 70 |
| Kirkwood, O. | 60 | *70 | 70 |
| Piqua, O. | †60 | *60 | 60 |
| Farrington, O. | †60 | *60 | 60 |
| Eldena, O. | †60 | *60 | 60 |
| Troy, O. | .... | .... | 60 |
| Tippecanoe City, O... | †60 | 70 | 60 |
| Vandalia, O. | †60 | 70 | 60 |
| Dayton, O. | †60 | 70 | .... |
| Whitfield, O. | 70 | 80 | 60 |
| Miamisburg, O. | 70 | 80 | 60 |
| Carlisle, O. | 70 | 80 | 60 |
| Poast Town, O. | 70 | 80 | 60 |
| West Middletown, O. | 70 | 90 | 60 |
| Trenton, O. | 70 | 90 | 60 |
| Overpeck, O. | 70 | 90 | 60 |
| Hamilton, O. | 70 | 90 | 60 |
| Stockton, O. | 70 | 90 | 60 |
| Glendale, O. | 70 | 100 | 60 |
| Woodlawn, O. | 70 | 100 | 60 |
| Wyoming, O. | 70 | 100 | 60 |
| Lockland, O. | 70 | 100 | 60 |
| Maplewood, O. | 70 | 100 | 60 |
| Hartwell, O. | 70 | 100 | 60 |
| Carthage, O. | 70 | 100 | 60 |
| Elmwood Place, O. | 70 | 100 | 60 |
| Ivorydale, O. | 70 | 100 | 60 |
| Winton Jct., O. | 70 | 100 | 60 |
| College Hill Jct., O... | 70 | 100 | 60 |
| North Side, O. | 70 | 100 | 60 |
| South Side, O. | 70 | 100 | 60 |
| Fairmount, O. | 70 | 110 | 60 |
| Brighton, O. | 70 | 110 | 60 |
| Gest St., O. | 70 | 110 | 60 |
| Cincinnati, O. | 70 | 110 | 60 |

*Rate from Dayton under intermediate rule.
†Minimum rate under P. S. M. 923, 60c.

19289. To establish on **sand and gravel**, carloads, from Lafayette, Ind., to Deniston, Ind. (siding on N. Y. C. & St. L. R. R. 19.5 miles east of Lafayette, Ind.), rate of 60c per net ton. Present rate, 70c per net ton.

19290. To establish on **sand and gravel**, carloads, from Phalanx, Ohio, rate of 85c to Kinsman and Williamsfield, Ohio, and 90c per net ton to Andover, Ohio. Present rate, 100c per net ton per Erie R. R. Tariff I. C. C. A6780.

19291. To establish on **crushed stone**, in bulk only; **crushed stone screenings**, in bulk only, carloads; **limestone, agricultural** (not ground or pulverized), in bulk in open top cars only, carloads; **stone tailings**, carloads, from Narlo, Ohio, to Wren, Ohio, rate of 105c per net ton. Present rate, sixth class.

19294. To establish on **crushed stone**, in bulk, and **agricultural limestone** (not ground or pulverized), in bulk in open top cars, carloads, from Findlay and Lima, Ohio, to Garrett, Ind., rate of 100c per net ton. Present rate—From Findlay, rate of 15c and from Lima, Ohio, rate of 14½c (sixth class) per C. F. A. L. Tariff I. C. C. 1938.

19295. To establish on **sand and gravel**, carloads, from Fair Oaks, Ohio, to points in Ohio, rates as shown below (rate, cents per net ton):

| To— | Proposed | Present |
|---|---|---|
| Fresno, Ohio | 80 | 110 |
| Chili, Ohio | 80 | 110 |
| Baltic, Ohio | 85 | 110 |

19296. To establish on **sand and gravel**, carloads, from Greenfield, Ohio, to points in Ohio, rates as shown in Exhibit B attached. Present and proposed rates as shown in Exhibit B attached. From Greenfield, Ohio (in cents per net ton):

EXHIBIT B

| To— | Miles | Proposed | Present |
|---|---|---|---|
| Cincinnati, O. | 75 | 80 | 100 |
| Madeira, O. | 58 | 80 | 90 |
| Miami Grove, O. | 54 | 80 | 90 |
| Twightwee, O. | 51 | 80 | 90 |
| Loveland, O. | 50 | 80 | 90 |
| Hills, O. | 45 | 80 | 90 |
| Cozaddale, O. | 41 | 80 | 90 |
| Pleasant Plain, O. | 41 | 80 | 90 |
| Windsor, O. | 37 | 80 | 80 |
| Blanchester, O. | 34 | 60 | *70 |
| Midland City, O. | 30 | 60 | *70 |
| Martinsville, O. | 24 | 60 | 70 |
| Farmers, O. | 22 | 60 | **70** |
| New Vienna, O. | 18 | 60 | 70 |
| Highland, O. | 13 | 60 | 70 |
| Leesburg, O. | 10 | 60 | 70 |
| East Monroe, O. | 7 | 60 | 70 |
| Lyndon, O. | 2 | 60 | 70 |
| Harpers, O. | 6 | 60 | 70 |
| Roxabel, O. | 11 | 60 | 70 |
| Musselman, O. | 13 | 60 | 70 |
| Anderson, O. | 17 | 60 | 70 |
| Chillicothe, O. | 23 | 60 | 70 |
| Schooleys, O. | 31 | 80 | 80 |
| Vigo, O. | 35 | 80 | 80 |
| West Junction, O. | 38 | 80 | 80 |
| Ray, O. | 43 | 80 | 90 |
| Byers, O. | 46 | 80 | 90 |
| Richland, O. | 47 | 80 | 90 |
| Lesmil, O. | 50 | 80 | 90 |
| Hamden, O. | 53 | 80 | 90 |
| Dundas, O. | 57 | 80 | 90 |
| Duncans Switch, O. | 61 | 80 | 100 |
| Zaleski, O. | 65 | 80 | 100 |
| Hope, O. | 69 | 80 | 100 |
| Mineral, O. | 74 | 80 | 100 |
| Kennard, O. | 78 | 110 | 110 |
| Carbondale, O. | 79 | 110 | 110 |
| New Marshfield, O. | 77 | 80 | 110 |
| Luhrig, O. | 80 | 80 | 110 |
| Grosvenor, O. | 83 | 80 | 110 |
| Athens, O. | 84 | 80 | 110 |
| Canaanville, O. | 91 | 80 | 110 |
| Guysville, O. | 96 | 80 | 110 |
| Stewart, O. | 98 | 80 | 110 |
| Frosts, O. | 103 | 80 | 120 |
| Colville, O. | 107 | 80 | 120 |
| Torch Hills, O. | 109 | 90 | 120 |
| Little Hocking, O. | 113 | 90 | 120 |
| Porterfield, O. | 116 | 90 | 120 |
| Belpre, O. | 120 | 90 | 120 |
| Westboro, O. | 38 | 70 | 80 |
| Lynchburg, O. | 45 | 70 | 90 |
| Russells, O. | 49 | 70 | 90 |
| Hillsboro, O. | 55 | 70 | 90 |

Present rates per mileage scale shown in B. & O. Tariff H3336C, Ohio No. WL3038, unless otherwise provided.

*Chillicothe, Ohio rate under intermediate rule, per H3336C.

19337. To establish on **agricultural limestone**, in box cars, carloads, minimum weight 50,000 lb., Gibsonburg, Ohio, to Douglas and Jacobs Creek, Penn., P. & L. E. R. R. delivery, rate of 202c per net ton. Present rate, 382c per net ton.

19348. To establish on raw or crude **dolomite**, in closed cars, carloads, Gibsonburg, Ohio, to Clarksburg, W. Va. (B. & O. R. R. delivery), 265c per net ton. Present rate, 460c per net ton (sixth class).

19349. To establish on **sand** (other than blast, engine, foundry, glass, loam or molding) and **gravel**, carloads, West Pittsburgh, Penn., to New Castle, Penn. (B. & O. R. R.), 50c per net ton. Present rate, 60c per net ton.

19358. To establish on **crushed stone and crushed stone screenings**, carloads, Bluffton, Ohio, to Oxford, Ohio, 125c per net ton. Route: Via Lima, Ohio, and B. & O. R. R. Present rate, sixth class.

19374. To establish on **sand and gravel**, carloads, from Elkhart, Ind., 60c to New Paris, Ind., and 65c per net ton to Milford, Ind. Present rate—70c to New Paris, Ind., and 75c per net ton to Milford, Ind.

19383. To establish on **crushed stone and crushed stone screenings**, carloads, Whitehouse, Ohio, to points in Michigan, via Toledo and Pere Marquette R. R., rates as shown in Exhibit "B" attached. Present rates, sixth class.

EXHIBIT B

| To Michigan points— | Proposed | To Michigan points— | Proposed |
|---|---|---|---|
| Bay City | $1.35 | Clifford | $1.45 |
| Saginaw | 1.35 | Grosvenor | .87 |
| McGraw | 1.25 | Lewanne Junction | .87 |
| South Lyons | 1.07 | Tecumseh | .92 |
| Annpere | 1.12 | Manchester | .92 |
| Howell | 1.12 | Jackson | 1.07 |
| Trowbridge | 1.25 | Hudson | .97 |
| Lansing | 1.25 | Hillsdale | 1.02 |
| Grand Ledge | 1.25 | Jonesville | 1.07 |
| Woodbury | 1.35 | Coldwater | 1.45 |
| Elmsdale | 1.45 | Sturgis | 1.45 |
| Grand Rapids | 1.55 | White Pigeon | 1.45 |
| Waverly | 1.65 | Three Rivers | 1.45 |
| Grand Haven | 1.65 | Schoolcraft | 1.45 |
| Muskegon | 1.75 | Kalamazoo | 1.55 |
| Sparta | 1.55 | Plainwell | 1.55 |
| Ionia | 1.35 | Allegan | 1.65 |
| Haynor | 1.45 | Grand Rapids | 1.76 |
| Kidd | 1.45 | Tipton | .97 |
| Greenville | 1.45 | Addison Junction | 1.02 |
| Howard City | 1.55 | Jerome | 1.02 |
| Sheridan | 1.45 | Hanover | 1.07 |
| Stanton | 1.45 | Homer | 1.12 |
| Edmore | 1.55 | Albion | 1.15 |
| Holland | 1.65 | Eaton Rapids | 1.25 |
| Grand Junction | 1.75 | Lansing | 1.25 |
| Vassar | 1.45 | | |

19385. To establish on **sand, gravel and crushed stone**, carloads (See Note 1). Proposed rates: In cents per ton of 2000 lb., to Bluford, Ill., from Metropolis-Brokport, Cairo, Palestine, Ill., Merom, Ind., 100c on sand and gravel; Shetlerville, Krause, Stolle, Falling Springs, Anna, Ill., 100c on crushed stone. Present rates: No rates to Bluford via I. C. R. R. except where mileage rates apply or whereby application of intermediate rule the Benton or Edgewood rates can be made to apply.

19386. To establish on **crushed stone**, carloads, Carey, Ohio:

| To— | Proposed rates in cents per net ton | Present rate sixth class |
|---|---|---|
| Cadiz, O. | 145 | 191½ |
| East Rochester, O. | 135 | 181½ |
| Kensington, O. | 135 | 181½ |

19387. To establish on **sand**, carloads, Jackson, Ohio, to Taylor, Ohio, 120c per net ton. Present rate, $1.40 per net ton.

19395. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, carloads, Elkhart, Ind., to Millers, Ind., 55c per ton. Route—Via N. Y. C. R. R. Present rate, 70c per ton.

19437. To establish on **crushed stone**, carloads, Sandusky, Ohio, to Oxford, Ohio, 145c per net ton. Present rate, 20½c.

19490. To establish on **gravel and sand**, except blast, core, engine, filter, fire or open furnace, glass, grinding or polishing, loam, molding or silica, in open top cars (See Note 3), 65c per net ton, Connersville and Richmond, Ind., to Newcastle, Ind. Present rate 60c per net ton.

19500. To establish on **crushed stone**, in bulk, in open cars, and **crushed stone screenings**, in bulk, in open cars, carloads (See Note 3).

| To stations— N. Y. C. Railroad. | From Kenneth, Ind. Proposed | Present |
|---|---|---|
| Dune Park, Ind. | 115 | 161 |
| Goshen, Ind. | 110 | 130 |
| De Motte, Ind. | 95 | 112 |
| Knox, Ind. | 90 | *101 |
| North Liberty, Ind. | 100 | 101 |
| Olivers, Ind. | 105 | 127 |
| Teft, Ind. | 90 | 101 |

*Rate via N. K. P. is 85c.

19501. To establish on **ground or pulverized limestone** (unburnt), carloads, minimum weight 60,000 lb., from Painesville, Ohio, in cents per ton of 2000 lb., except as noted.

| To— | Proposed | *Present |
|---|---|---|
| Butler, Penn. | 200 | 17.0 |
| Chester, W. Va. | 200 | 17.0 |
| Columbus, Ohio | 220 | 18.5 |
| Dayton, Ohio | 250 | 21.0 |
| Newark, Ohio | 220 | 18.5 |
| Springfield, Ohio | 250 | 20.5 |

*Rates in cents per 100 lb.

19473. To establish on **crushed stone**, in bulk, in open cars, carloads (See Note 3), Delphos, Ohio, to Celina, Ohio, 80c per net ton; to Cecil, Ohio, 90c per net ton; to Bryan, Ohio, 100c per net ton. Present rates—100c per net ton to Celina and Cecil, Ohio, and 110c per net ton to Bryan, Ohio.

19474. To establish on **crushed stone**, in bulk, in open cars; **crushed stone screenings**, in bulk, in open cars, carloads (See Note 3), Kenneth, Ind., to Wolcottville, Ind., via Penna. R. R., 100c per net ton. Present rate—400c per net ton, sixth class.

19475. To establish on **crushed stone**, in open cars, **crushed stone screenings**, in bulk, in open cars, carloads (See Note 3), from Kenneth, Ind.

| To— | Proposed | Present |
|---|---|---|
| East Saugatuck, Mich. | 132 | 207 |
| Grand Junction, Mich. | 127 | 138 |
| Hartford, Mich. | 122 | 138 |
| Holland, Mich. | 135 | 207 |
| Lee, Mich. | 127 | 207 |

19478. To establish on **gravel**, carloads (See Note 3), East St. Louis, Ill., to South Bend, Ind., 305c per net ton, applicable only to shipments originating at Pacific, Jedburg and Yeatman, Mo. Present rate, 360c per net ton.

19488. To establish on **crushed stone**, carloads (See Note 3), 114c per net ton, Milltown, Ind., to Columbus and Jonesville, Ind. Present rate—Sixth class.

### ILLINOIS FREIGHT ASSOCIATION DOCKET

3330F. **Sand and gravel**, carloads (See Note 2), but not less than 40,000 lb., from Chillicothe, Ill., to North Henderson, Alexis and Gerlaw, Ill. Rates per net ton. Present, $1; proposed, $1.13.

4264, Sub. 1. **Sand and gravel**, carloads, from Janesville, Afton, Riton and Beloit, Wis., to Faithorn, Ill. Present, $1.68 per net ton; proposed, $1.20 per net ton.

4574, Sub. 1. **Blast, engine, foundry, glass and molding, sand**, carloads, from Bowes, Ill., to Milwaukee, Wis. Present, class; proposed, $1.60 per net ton.

4609. **Sand and gravel**, carloads, from Joliet, Ill., to Ahern, Ill. Rates in cents per net ton. Present, 88c; proposed, 70c.

4610. **Sand and gravel**, carloads, from Camanche, Iowa, to various points in Illinois and Wisconsin. Rates in cents per net ton:

| To (representative points)— | Pres. | Prop. |
|---|---|---|
| Racine, Wis. | * | 130 |
| Milwaukee, Wis. | * | 130 |
| Willow Tower, Ill. | * | 130 |
| Normandy, Ill. | * | 80 |
| Buda, Ill. | * | 100 |
| Peoria, Ill. | * | 100 |

*Class rates.

4634. **Crude rock silica** (See Note 2), but not less than 60,000 lb., to Murphysboro, Ill.

| From— | Per 100 lb. Present | Per net ton Proposed |
|---|---|---|
| Thebes, Ill. | 10½ | 63 |
| Gale, Ill. | 10½ | 63 |

**SOUTHWESTERN FREIGHT BUREAU DOCKET**

15607. **Sand** from points in Oklahoma to points in Kansas. To establish the following rates in cents per 100 lb. on sand, carloads (See Note 1), except when cars are loaded to full visible or space-carrying capacity, in which event the actual weight will govern, from and to points shown below:

FROM (St. L.-S.-F.)
Shirk to Engle, Okla.
(Indices 2827 to 2915), inclusive.
Afton to Tulsa, Okla.
(Indices 2320 to 2450), inclusive.
(Indices 4540 to 4562), inclusive.
Goodeagle to Hesser, Okla.

TO (St. L.-S. F.)

| | | |
|---|---|---|
| Neutral to Goodeagle, Kan. | (*) | (†) |
| (Indices 4530 to 4540), inclusive | 6½ | (1) |
| Columbus to Cherryvale, Kan. | | |
| (Indices 3385 to 3435), inclusive | 6½ | (1) |
| Cherokee to Turck, Kan. | | |
| (Indices 4500 to 4525), inclusive | 6½ | (1) |
| Mackie to Mortimer, Kan. | | |
| (Indices 4800 to 4850), inclusive | 6½ | (1) |
| Corner to Neodosha, Kan. | | |
| (Indices 3440 to 3450), inclusive | 7 | (1) |

(A. T. & S. F.)

| | | |
|---|---|---|
| Humboldt to Cherryvale, Kan. | | |
| (Indices 1955 to 1985), inclusive | 6½ | (2) |

FROM (St. L.-S. F.)
Shirk to Kengle, Okla.
(Indices 2815 to 2827), inclusive.
Vinita to Tulsa, Okla.
(Indices 2340 to 2450), inclusive.

(M.-K.-T.)
Russell Creek to Vinita, Okla.
(Indices 1285 to 1300), inclusive.

TO (M.-K.-T.)

| | | |
|---|---|---|
| Labette to Chetopa, Kan. | | |
| (Indices 1260 to 1275), inclusive | 6½ | (3) |
| Parsons to Shaner, Kan. | | |
| (Indices 795 to 800), inclusive | 6½ | (2) |
| Ladore to Humboldt, Kan. | | |
| (Indices 1065 to 1095), inclusive | 6½ | (4) |

FROM (St. L.-S. F.)
Shirk to Kengle, Okla.
(Indices 2815 to 2827), inclusive.
Tulsa, Okla.
(Index 2450.)

(A. T. & S. F.)
Owen to Tulsa, Okla.
(Indices 2755 to 2815), inclusive.

TO (A. T. & S. F.)

| | | |
|---|---|---|
| Bolton to Caney, Kan. | | |
| (Indices 2730 to 2745), inclusive | 6½ | (5) |
| Humboldt to Independence, Kan. | | |
| (Indices 1955 to 1990), inclusive | 6½ | (6) |

(*) Rate. (†) Route.

Index numbers shown are as shown in F. A. Leland's Open and Prepay List No. 40.

Explanation of routes:
Route
(1) St. L.-S. F. direct.
(2) St. L.-S. F. Cherryvale, Kan., and A.T.&S.F.
(3) St. L.-S. F. Vinita, Okla., M.-K.-T.
(4) M.-K.-T. direct.
(5) St. L.-S. F. Tulsa, Okla., and A. T. & S. F.
(6) A. T. & S. F. direct.

It is proposed to establish from Oklahoma points named above the same figures approved by the Interstate Commerce Commission in I.C.C. Docket 18303 from Price, Okla.

15633. **Stone** from Pfeiffers Quarry, Ark., to New Orleans, La. To establish rate of 31½c per 100 lb. on stone, carloads, description and minimum weight as per Item 1300 of W. T. L. Tariff No. 106G, from Pfeiffers Quarry, Ark., to New Orleans, La. It is felt that the rate from Pfeiffers Quarry, Ark., should not exceed the rate from Carthage, Mo.

**WESTERN TRUNK LINE DOCKET**

6623. **Sand**, carloads, as described in Item 6490A, Supplement No. 22, W. T. L. Freight Tariff No. 111F, I. C. C. No. A1830 (See Note 2), with usual limitation for smaller space capacity of cars. No change. From Kansas City, Mo., to Cheyenne, Wyo. Present rate, 33½c per 100 lb.; proposed rate, 18½c per 100 lb.

6571, Sup. 1. **Sand and gravel**, carloads, usual minimum weight, from Akron, Iowa, to Aberdeen, S. D. Present, 14c; proposed, 9½c.

2051GG. **Stone, crushed**, carloads (See Note 3), but in no case less than 40,000 lb., from Dell Rapids, S. D., to Crawford, Neb. Rate—Present, 20½c; proposed, 18½c.

1376Z. **Sand (silica)** (See Note 1), but not less than 60,000 lb., except where car of less than 60,000 lb. is furnished at carrier's convenience the marked capacity of car will apply, from stations shown below, to Wichita, Kan.

| | Present | Proposed |
|---|---|---|
| Arkalon, Kan. | 27½ | 14½ |
| Fowler, Kan. | 24½ | 14½ |
| Kismet, Kan. | 26 | 14½ |
| Meade, Kan. | 24½ | 14½ |
| Missler, Kan. | 24½ | 14½ |

1564N. **Stone, crushed**, usual minimum weight, from Dell Rapids, S. D., to Burlington and Keokuk, Iowa, via Des Moines, on C. B. & Q. Ry. Present—To Burlington, 16c; Keokuk, 15c per 100 lb. Proposed—To Burlington, 12c; Keokuk, 11c per 100 lb.

6633. **Sand and gravel**, carloads, from Blue Rapids, Kan. to St. Joseph, Mo. Present—14c per 100 lb. (Class E). Proposed—7c per 100 lb. Present minimum weight—40,000 lb. Proposed—90% of marked capacity of car, except that when actual weight of shipment loaded to full visible capacity is less than 90% of marked capacity of car, the actual weight will apply, but not less than 40,000 lb.

## Rates on Sand, Gravel and Rock Revised in South Carolina

THE Railroad Commission of South Carolina on August 23 adopted the single line haul scale rates on sand, gravel and crushed stone intrastate in South Carolina and in an official order made the single line rate applicable to both single and joint line hauls by the shortest route, thereby eliminating all differentials now applicable. The action was unanimous and upon motion made by J. H. Nance, vice-chairman of the commission.

The order will go into effect 30 days from date, and will give to shippers approximately the same average rates on like material as now exists in Georgia.

The decision of the commission was reached after a study of expert testimony introduced at a three-day hearing ordered by the commission on its own initiative after the state highway commission, chief objector to existing rates, had declined to inaugurate the proceedings.

## Hearing on Pennsylvania Plus Rate Controversy

THE Carbon Limestone Co. complaint before the Interstate Commerce Commission, involving the plus basis of freight rates on crushed stone from Shaw Junction, Penn., to points on the connecting lines of the Pittsburgh and Lake Erie Railroad, was set for hearing in Pittsburgh on September 7. The rates were published on the basis of 20 cents per ton over the scale prescribed by both the Interstate Commerce Commission and the Public Service Commission of Pennsylvania, for single line hauls.

Both commissions prescribed the plus basis of rates for two-line hauls, which, it is alleged, operated to exclude the complainants from marketing their product at points where this basis of rates obtains in competition with limestone producers located on the connecting lines of the Pittsburgh and Lake Erie who would not be subject to the plus basis for single-line hauls.

## North Carolina Quarry Industries Booming

STONE PRODUCTION in North Carolina during 1927 experienced its banner year with a value of more than $500,000 above that of 1926, figures announced today by the department of conservation and development show.

The total value of stone furnished from "Tar Heel" quarries for 1927 was given at $4,879,235 as compared with $4,285,873 for the previous year, an increase of $594,562. Under the classification of stone is placed granite, marble, limestone and marl.

"Granite, the most important stone in the state from a commercial standpoint, comes principally from Surry and Rowan counties," says State Geologist H. J. Bryson. "The names 'Mt. Airy Gray' and 'Salisbury pink' are well known trade names throughout the eastern United States.

North Carolina marble and limestone come principally from Cherokee, McDowell, Henderson, and Madison counties in the western part of the state, while the shellrock and marl come entirely from the eastern counties especially New Hanover, Craven and Jones. The production of these materials for 1927 was $425,364, or an increase of $86,453 over that of the previous year.

In the past year, a great deal of activity has been shown in Cherokee and Madison counties. A new company has been organized in Cherokee county to produce marble for building tombstones and crushed stone for construction work. Considerable core drilling was carried on and revealed a large supply of white, "Confederate gray" and the "regal" blue. Machinery such as gang saws, polishers, etc., is now being installed to furnish the stone for the various trades.

It has been reported that two companies are installing small furnaces for the purpose of carrying on certain tests to extract the metal magnesium from the dolomite marble and limestone. Theoretically pure dolomite has been discovered at a number of localities in both Cherokee and Madison counties. If the process of extracting magnesium proves successful and economical, a very important industry will be added to the many already existing in the state, according to the state geologist.

Two processes for extracting magnesium have been worked out already, one by a German concern and another by an American firm have proved successful. These processes have been successful on a material similar to that found in this state. The metal magnesium will be used in competition with aluminum.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

# Selling Through Advertising

## Products Industry Must Promote Constant, Accurate Sales Information in Order to Meet Competition

By M. R. Bowers
Promotion Engineer, Portland Cement Association

THERE have been occasions in the industrial progress and development of the United States where industries have made astonishing growth without giving a great deal of thought to the merchandising side of the business. These, however, have been exceptions. Success of this sort is only possible where the merits of the product being offered to the public are so outstanding that the public comes direct to the manufacturer for the goods when ready to use them.

However, such a condition cannot continue indefinitely. Other manufacturers will be attracted to the field and competition develops. When competition enters, the problem becomes one of merchandising. This means that business will go to those manufacturers who can sell the idea that their products are superior to those of their competitors in their particular field.

Let us apply this to the concrete products industry. From a business practically unknown before the war, the concrete products industry has developed to a point where it represents over $140,000,000 in capital investment. This development did not take place by dint of aggressive merchandising practices but through public acceptance of the true merits of concrete masonry as a worthy building material. To be sure there have been exceptions as there usually are to every rule, but speaking of the products industry in general this has been the true state of affairs.

Fire safety, strength, durability and economy are a few of the qualities obtained when concrete masonry is selected for the building material and it has been through experience and education that the building public has come to know the value of using such materials. When a man or a corporation builds a home or an office building the thought in mind is usually a substantial attractive place in which to live or transact business or else a good, negotiable investment. The economy of construction, low maintenance costs and fire-safety of concrete masonry have had no little amount of influence in winning builders over to using this material.

The effect of this progressive growth in the products industry by virtue of the merits of its products has been to arouse competitors in the building material field to the realization that business they formerly enjoyed has been taken away from them. First it was the foundation and basement walls and now we are strongly contesting for above-grade construction, back-up and partition walls, with the result that competitive

*This attractive billboard is selling concrete masonry units every day in a large southern city*

*The Wisconsin Products Association uses this method to advertise that products of its members are tested*

interests have undertaken a program of intensive campaigning to win back this business lost to themselves. Millions of dollars are being spent in advertising, selling and propaganda toward this end and we can no longer afford to sit complacently by and feel safe in our own security. To maintain and increase the business we have will require plenty of fight and action.

***Salesmen and Advertising Necessary***

The plants that survive this competition will be those which employ salesmen and effective advertising consistently and regularly. One needs only to visit products plants in various parts of the country to gather ample proof of what a live merchandising program can do to maintain present business and stimulate new orders. What the industry needs is more plants on the order of the Pierson Concrete Products Co. of East Orange, N. J., the C. E. Lindsley Co., Inc., of Irvington, N. J., the Cinder Concrete Units Corp. of Boston, the Hunt Stone Tile Co. of Salem, Mass., the Elmhurst-Chicago Stone Tile Co. of Elmhurst, Ill., the Pennsylvania Brick and Tile Co. of Philadelphia and others of similar class which limited space prohibits listing.

These plants are running the year around because those in charge are not satisfied with present orders—they want more and they are going out for more with salesmen and live advertising copy. They realize that advertising, both direct mail and newspaper, is not a luxury to be indulged in by prosperous plants when times are good, but a *necessity* that must be used regularly in order to stimulate desire for fire-safe and permanent features in homes, schools, hospitals and office buildings. They are observing the simple truism, "You cannot desire that which you do not know," by telling the building public through the newspapers and direct mail folders and pamphlets how good concrete masonry units are for these types of buildings, describing their merits and telling the public where to buy them.

Advertising is printed salesmanship and properly written and consistently scheduled it can do wonders in stimulating desire and breaking down personal sales resistance. Pick up any newspaper today and turn through the advertising pages. You find carefully prepared advertisements of nationally known and accepted products. A study of these pages will reveal ample proof of what competitive interests are doing. Remember this—a great deal of this advertising covers building materials that have been known to man down through the ages, while concrete masonry units are comparatively new. It is high time that we climbed on the band wagon and demonstrated to the world what a $140,000,000 industry can really do when aroused to its possibilities.

# Small Cement Products Plant Operated in Conjunction With a Sand Plant

## Wide Variety of Units Manufactured Using Aggregate from Gravel Plant

SINCE cement products have been found by many producers of sand and gravel to be an excellent outlet for their surplus material, it is now not in the least unusual to find producers entering this field to supplement their regular business. Some have entered the field in a whole-hearted manner and have actually made the products portion of the business the biggest part. On the other hand there is a growing tendency to start only a small plant which becomes only one factor in the general success of the whole operation. When such a plant is designed along modern lines and utilizes up-to-date equipment it is a credit to the company and a steady source of revenue as well. On the other hand, when the products plant is a makeshift affair, using inefficient and undesirable methods, it frequently becomes a burden to the main company and a detriment to the concrete products industry in general.

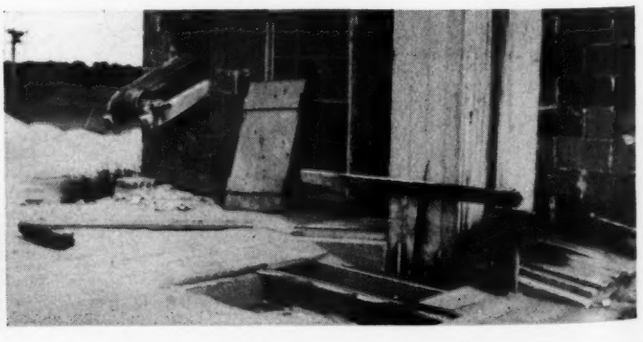
A very good example of a well-operated and desirable small products plant built in connection with a gravel operation, is the plant of the Peters Sand and Gravel Co. near Burlington, Wis. This plant is well designed, using the gravity system entirely, and is specially equipped for making special pieces of ornamental stone work as well as the regular blocks.

At this plant sand and pea gravel are brought by truck from the gravel operation a short distance away and dumped to a hopper at the rear of the plant which feeds to a chain bucket elevator with 6-in. buckets. The materials are then elevated to overhead bins on the third floor of the plant and from the bins they flow by gravity to an Ideal barrel mixer directly beneath the bins on the second floor. Cement is also delivered by truck to the rear of the plant, and carried to the second floor by a home-made belt conveyor, set at approximately a 30-deg. angle.

Directly below the mixer on the ground floor is a Universal face-down block machine capable of turning out 1000 8-in. block daily. Blocks from the machine are placed on wooden racks and transported by means of Barrett-Craven lift trucks. The entire ground floor is of concrete to facilitate the movement of the trucks. Curing of the products is accomplished at one end of the large ground floor of the plant. After curing inside the building, the pieces are stored in a large yard outside until shipped.

Beside regular 8-in. block and 8-in. rock-face block, the Peters company turns out a wide variety of special pieces. These include urns, bird baths, balustrade columns and flower pots, as well as chimney block and similar architectural pieces. Since Burlington is in the heart of a popular lake district, where there are numerous summer cottages and estates, the special pieces find a ready market in the community and it is natural that the Peters company should bother with them, where a concern in another locality would find it absolutely unprofitable. Steel forms are used exclusively for this work, and have proved to be entirely satisfactory.

***The products plant of the Peters and and Gravel Co., Burlington, Wis., showing the arrangement of the material elevator and overhead bins***



***Material is handled at the Peters plant by the cement conveyor, left, and the hopper and bucket elevator, right, located at the rear of the plant***

*Interior of the plant showing the block machine fed by gravity from the mixer on the floor above*

*Concrete urn made at the plant, with the mold behind and other special molds beyond*

This plant is not operated all of the time, as the demand of the surrounding market does not warrant it. However, it is run a considerable portion of the season, and provides an opportunity to keep a number of men from the sand plant on the job when that operation is closed down or is not running at capacity. It is also advantageous to the Peters company since the company operates a building supply yard in the city of Burlington and would otherwise have to purchase its cement blocks from an outsider. So, with the primary factor of being a ready outlet for surplus material, the plant is really a decided asset to the company in every way.

The plant is on both the Milwaukee railroad and the "Soo" line, but very little of the products are shipped out by rail. Almost all of the products are trucked out, being sold through the Burlington material yard to users in the immediate vicinity.

The general offices of he company are in Burlington. J. W. Peters is the owner of the company, and A. J. Stock is the superintendent for both the sand plant and the concrete products plant.

## Benedict Stone Co. of Maryland Acquires New Plant

THE Benedict Stone Co. of Maryland, Inc., Baltimore, Md., has acquired one of the main buildings formerly occupied by the Bethlehem Shipbuilding Co. of Baltimore, and will remodel and equip the property for a new concrete architectural trim-stone plant. The company's present works will be removed to the new location and the capacity will be increased. The shipbuilding company is to build new works to replace the building taken over by the Benedict company, and these will cost, with the addition of a new dry dock, about $1,000,000.

## New Skyscrapers Use Concrete Units

FOR the first time in the history of the building industry, concrete masonry units are being used throughout the entire construction of skyscrapers. The structures in which these units are being adopted are the Integrity Trust building and the Bouvier apartments, both of Philadelphia. These buildings are now under construction.

The Integrity Trust building will, when completed, be 25 stories high and contain

*Some of the special products, including a bird bath, balustrade column, urn, and chimney blocks*

350,000 cinder concrete units in addition to 1,000,000 concrete brick.

The apartment building, which is to be a 23-story structure, will have cinder concrete masonry units for back-up and fireproofing. Approximately 165,000 masonry units and 1,150,000 concrete brick will be used in the exterior walls alone.

## New Products Plant Being Erected in Enid, Okla.

CONSTRUCTION has started on a factory to manufacture concrete boards at Enid, Okla. The concern will be known as the Dodson Concrete Board Co., and will be part of the expansion program of the company which is now manufacturing these products at Wichita, Kan. A site for the new plant was leased at Fourth and Chestnut streets in Enid from the Santa Fe railroad. The first structure will be 25x100 ft. Approximately 15 men will be employed by the organization at first.

O. N. Roth of Wichita, formerly chancellor of Phillips university of Enid, will manage the new plant.

The new board was introduced in Wichita several months ago. It is of concrete and the construction of a building is made by grooves and bolts.

The Wichita plant of the concern has been shipping a large amount of material into Oklahoma territory. This impressed officials so a survey of the Enid district was made by C. S. Wikoff and E. S. LaMont. It was then decided to locate the first Oklahoma plant in this city and use this as a state organization.—*Enid* (Okla.) *Eagle.*

## Colorado Marble Crushing Plant to Make Terrazzo

THE MILL AND CRUSHER, erected a year or two ago by the Fremont Feldspar Co. near the old Florence and Cripple Creek Railroad Co.'s station, Canon City, Colo., has been sold to the United States Marble Co. of Denver, which will place it in operation in a few days for the marketing of materials for stucco and terrazzo.

After the failure of the Fremont Feldspar Co. its plant was sold to Sylvanus Hynes under foreclosure proceedings, who in turn disposed of it to the United States Marble Co. Additional machinery will be installed by the purchasing company, after which the plant will be started up, with Roland Winburn as general manager and W. R. Winburn as superintendent.

Marble quarried on the Dudley Van Buskirk place on Shaw park, which is said to be admirably adapted to the purpose, will be crushed at the plant, as will also marble quarried near Wellsville in the western part of the county.

It is reported that there is a big demand for the product of the company in Chicago and other mid-western cities.—*Canon City* (Colo.) *Record.*

# The Rock Products Market

## Wholesale Prices of Crushed Stone

**Prices given are per ton, F.O.B., at producing point or nearest shipping point**

### Crushed Limestone

| City or shipping point | Screenings, ¼ inch down | ½ inch and less | ¾ inch and less | 1½ inch and less | 2½ inch and less | 3 inch and larger |
|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | |
| Buffalo, N. Y. | 1.30 | 1.30 | 1.30 | 1.30 | 1.30 | 1.30 |
| Chaumont, N. Y. | .50 | 1.75 | 1.75 | 1.50 | 1.50 | 1.50 |
| Chazy, N. Y. | .75 | 1.75 | 1.60 | 1.30 | 1.30 | 1.30 |
| Dundas, Ont. | .53 | 1.05 | 1.05 | .90 | .90 | .90 |
| Farmington, Conn. | ..... | 1.30 | 1.10 | 1.00 | 1.00 | ..... |
| Frederick, Md. | .50@ .75 | 1.35@1.45 | 1.15@1.25 | 1.10@1.20 | 1.05@1.15 | 1.05@1.10 |
| Ft. Spring, W. Va. | .40 | 1.35 | 1.30 | 1.25 | 1.20 | ..... |
| Munns, N. Y. | .75 | 1.10 | 1.10 | 1.00 | 1.00 | ..... |
| Prospect, N. Y. | 1.00 | 1.40 | 1.25 | 1.25 | 1.25 | ..... |
| Rochester, N. Y.—Dolomite | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| St. Vincent de Paul, Que. (n) | ..... | 1.35 | 1.15 | .95 | .90 | 1.20 |
| Walford, Penn. | ..... | ..... | 1.35h | 1.35h | 1.35h | 1.35h |
| Watertown, N. Y. | 1.00 | 1.75 | 1.75 | 1.50 | 1.50 | 1.50 |
| Western New York | .85 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| **CENTRAL:** | | | | | | |
| Afton, Mich. | ..... | ..... | ..... | ..... | .50 | 1.50 |
| Alton, Ill. | 1.85 | ..... | 1.85 | ..... | ..... | ..... |
| Columbia and Krause, Ill. | 1.05@1.40 | .95@1.50 | 1.15@1.50 | 1.05@1.50 | 1.05@1.50 | ..... |
| Cypress, Ill. | 1.00@1.25 | 1.00@1.25 | 1.20@1.25 | 1.20@1.25 | 1.20@1.25 | 1.35 |
| Davenport, Iowa | 1.00 | 1.50 | 1.50 | 1.30 | 1.30 | 1.40 |
| Dubuque, Iowa | .85 | 1.00 | 1.25 | 1.25 | 1.25 | 1.25 |
| Stolle and Falling Springs, Ill. | 1.05@1.40 | .95@1.50 | 1.15@1.50 | 1.05@1.50 | 1.05@1.50 | ..... |
| Greencastle, Ind. | 1.25 | 1.05 | 1.05 | 1.05 | .95 | .95 |
| Lannon, Wis. | 1.00 | 1.00 | 1.00 | .90 | .90 | .90 |
| McCook, Ill. | 1.00 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Marblehead, Ohio (l) | .55 | .80 | .80 | .80 | .80 | .80 |
| Milltown, Ind. | ..... | .90@1.00 | 1.00@1.10 | .90@1.00 | .85@ .90 | .85@ .90 |
| Northern Ohio Points | .85@1.15 | 1.25 | 1.15 | 1.15 | 1.15 | 1.15 |
| Sheboygan, Wis. | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 |
| Stone City, Iowa | .75 | ..... | 1.20 | 1.10 | 1.00 | ..... |
| Thornton, Ill. | .90 | 1.00 | 1.25 | 1.25 | 1.25 | 1.25 |
| Toledo, Ohio | 1.60 | 1.70 | 1.70 | 1.60 | 1.60 | 1.60 |
| Toronto, Canada (m) | 2.50 | 3.00 | 3.00 | 2.85 | 2.85 | 2.85 |
| Valmeyer, Ill. (fluxing limestone) | .90@1.20 | ..... | ..... | 1.75 | ..... | 1.75 |
| Waukesha, Wis. | ..... | 1.10 | 1.10 | 1.10 | 1.10 | .90 |
| Winona, Minn. | 1.00 | 1.20 | 1.30 | 1.40 | 1.40 | 1.40 |
| Wisconsin Points | .50 | ..... | 1.00 | .90 | .90 | ..... |
| Youngstown, Ohio | .70j | 1.25l@1.35h | 1.25l@1.35h | 1.25l@1.35h | 1.25l@1.35h | 1.25l@1.35h |
| **SOUTHERN:** | | | | | | |
| Cartersville, Ga. | 1.20 | 1.65 | 1.65 | 1.45 | 1.15 | 1.15 |
| Chico, Texas | 1.00 | 1.30 | 1.25 | 1.20 | 1.10 | 1.05 |
| Cutler, Fla. | .40r@ .75r | ..... | ..... | 1.75r | ..... | 1.10r |
| El Paso, Tex. | .50@ .75 | ..... | 1.25 | 1.00 | 1.00 | 1.00 |
| Graystone, Ala. | Crusher run, screened, $1 per ton | | | | | |
| Kendrick and Santos, Fla. | 3½ in. and less, $1 per ton | | | | | |
| Olive Hill, Ky. | ..... | 1.00@1.10 | .90@1.00 | .90@1.00 | .90 | .90 |
| Rocky Point, Va. | .50@ .75 | 1.40@1.60 | 1.30@1.40 | 1.15@1.25 | 1.10@1.20 | 1.00@1.05 |
| **WESTERN:** | | | | | | |
| Atchison, Kan. | .50 | 1.80 | 1.80 | 1.80 | 1.80 | 1.80 |
| Blue Springs & Wymore, Neb. | .25 | 1.45 | 1.45 | 1.35c | 1.25d | 1.20 |
| Cape Girardeau, Mo. | 1.25 | ..... | 1.25 | 1.25 | 1.00 | ..... |
| Rock Hill, St. Louis, Mo. | 1.00 | 1.25 | 1.00@1.25 | .90@1.25 | .90@1.25 | .90@1.25 |
| Sugar Creek, Mo. | .75 | 1.00 | 1.20 | 1.20 | 1.20 | 1.20 |

(r) Cubic yard.

### Crushed Trap Rock

| City or shipping point | Screenings, ¼ inch down | ½ inch and less | ¾ inch and less | 1½ inch and less | 2½ inch and less | 3 inch and larger |
|---|---|---|---|---|---|---|
| Birdsboro, Penn. (q) | 1.20 | 1.60 | 1.45 | 1.35 | ..... | 1.30 |
| Branford, Conn. | .80 | 1.70 | 1.45 | 1.20 | 1.05 | ..... |
| Eastern Maryland | 1.00 | 1.60 | 1.60 | 1.50 | 1.35 | 1.35 |
| Eastern Massachusetts | .85 | 1.75 | 1.75 | 1.25 | 1.25 | 1.25 |
| Eastern New York | .75 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| Eastern Pennsylvania | 1.10 | 1.70 | 1.60 | 1.50 | 1.35 | 1.35 |
| Knippa, Tex. | 2.50 | 2.25 | 1.75 | 1.25 | 1.25 | 1.25 |
| New Britain, Plainville, Rocky Hill, Wallingford, Meridan, Mt. Carmel, Conn. | .80 | 1.70 | 1.45 | 1.20 | 1.05 | 1.05 |
| Northern New Jersey | 1.40@1.45 | 2.00@2.10 | 1.80@1.90 | 1.40@1.50 | 1.40@1.50 | ..... |
| Richmond, Calif. | .75 | ... | 1.00 | 1.00 | 1.00 | ..... |
| Spring Valley, Calif. | .50@ .75 | 1.00@1.25 | 1.00@1.25 | 1.00@1.25 | 1.00@1.25 | 1.00@1.25 |
| Springfield, N. J. | 1.45 | 2.10 | 2.00 | 1.60 | 1.60 | ..... |
| Toronto, Canada (m) | ..... | 5.80 | 4.05 | 4.05 | ..... | ..... |
| Westfield, Mass. | .60 | 1.50 | *.35 | 1.20 | 1.10 | ..... |

### Miscellaneous Crushed Stone

| City or shipping point | Screenings, ¼ inch down | ½ inch and less | ¾ inch and less | 1½ inch and less | 2½ inch and less | 3 inch and larger |
|---|---|---|---|---|---|---|
| Berlin, Utley, Montello and Red Granite, Wis.—Granite | 1.80 | 1.70 | 1.50 | 1.40 | 1.40 | ..... |
| Cayce, S. C.—Granite | ..... | ..... | 1.80 | 1.80 | 1.65 | ..... |
| Eastern Penn.—Sandstone | 1.35 | 1.70 | 1.65 | 1.40 | 1.40 | 1.40 |
| Eastern Penn.—Quartzite | 1.20 | 1.35 | 1.25 | 1.20 | 1.20 | 1.20 |
| Emathla, Fla.—Flint rock | 1.00 | ..... | 2.35 | ..... | ..... | ..... |
| Lithonia, Ga.—Granite | .75a | 1.75b | 1.75 | 1.40 | 1.35 | 1.25 |
| Lohrville, Wis.—Granite | 1.65 | 1.70 | 1.65 | 1.45 | 1.50 | ..... |
| Middlebrook, Mo. | 3.00@3.50 | ..... | 2.00@2.25 | 2.00@2.25 | ..... | 1.25@3.00 |
| Richmond, Calif.—Quartzite | .75 | ..... | 1.00 | 1.00 | 1.00 | ..... |
| Somerset, Penn. (sand-rock) | | | 1.50 to 1.85 | | | |
| Toccoa, Ga. | .40 | ..... | 1.35 | 1.30 | 1.25 | 1.25 |

(a) Sand. (b) to ⅜ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c cash discount deducted. (f) 1 in. to ¼ in., 1.45; 2 in. to ¾ in., 1.35. High calcite fluxing stone. 1.40. (h) Less 10c discount. (j) Less 10% net ton. (l) Less .05. (m) Plus .25 per ton for winter delivery. (n) Crusher run for ballast, .85. (p) Carload prices. (q) Crusher run, 1.40; ¼-in. granolithic finish, 3.00. (r) Cubic yd.

## Agricultural Limestone

**(Pulverized)**

| | |
|---|---|
| **Alton, Ill.—Analysis, 98% $CaCO_3$,** 0.01% $MgCO_3$; 90% thru 100 mesh.. | 4.50 |
| Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh | 1.50 |
| Blackwater, Mo.—100% thru 4 mesh.. | 1.00 |
| Branchton, Penn. — 100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh | 5.00 |
| Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh | 1.50 |
| Cartersville, Ga.—50% thru 50 mesh.... | 1.50 |
| Pulverized, per ton | 2.00 |
| Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk | 2.50 |
| Cypress, Ill.—Analysis, 88% $CaCO_3$; 10% $MgCO_3$; 50-90% thru 4 mesh.. | 1.25 |
| 50-90% thru 100 mesh | 1.35 |
| Danbury, Conn., and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$; 5% $MgCO_3$; fine ground, 90% thru 100 mesh; bulk | 3.50 |
| Paper bags | 4.75 |
| 100 lb. cloth bags | 5.25 |
| (All prices less .25 cash 15 days) | |
| Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 200 mesh, bags, per ton | 6.00 |
| 90% thru 20 mesh, bulk, per ton | 1.50 |
| Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked | 5.00 |
| Hot Springs and Greensboro, N. C.—Analysis, $CaCO_3$, 98-99%; $MgCO_3$, 42%; pulverized; 67% thru 200 mesh; bags | 3.95 |
| Bulk | 2.70 |
| Jamesville, N. Y. — Analysis 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags | 4.25 |
| Joliet, Ill.—Analysis, 52% $CaCO_3$; 46% $MgCO_3$; 50% thru 100 mesh.... | 2.50 |
| Knoxville, Tenn.—80% thru 100 mesh; bags, 3.95; bulk | 2.70 |
| Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk | 1.75 |
| Marl—Analysis, 95% $CaCO_3$; 0% $MgCO_3$; bulk | 2.25 |
| Marion, Va. — Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton | 2.00 |
| Middlebury, Vt. — Analysis 99.05% $CaCO_3$; 90% thru 50 mesh; bulk, 4.00; paper bags | 5.00 |
| Milltown, Ind. — Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk | 1.35@ 1.60 |
| Olive Hill, Ky.—90% thru 4 mesh | 1.00 |
| 90% thru 100 mesh | 2.00 |
| Piqua, Ohio—Total neutralizing power 101.12%; 99% thru 10, 60% thru 50; 45% thru 100 | 2.50 |
| 100% thru 10, 90% thru 50, 70% thru 100; bags, 5.00; bulk | 3.50 |
| 100% thru 4, 30% thru 100, bulk | 1.50 |
| Rocky Point, Va. — Analysis, $CaCO_3$, 97%; $MgCO_3$, 75%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk | 2.00 |
| Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk | 2.50 |

## Agricultural Limestone

**(Crushed)**

| | |
|---|---|
| Bedford, Ind.—Analysis, 98% $CaCO_3$; 1%, $MgCO_3$; 95% thru 10 mesh | 1.50 |

(Continued on next page)

## Agricultural Limestone

| | |
|---|---|
| Chico and Bridgeport, Tex. — 50% thru 100 mesh | 1.50 |
| Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 10 mesh, per ton | 1.25 |
| 90% thru 4 mesh, per ton | 1.10 |
| Dubuque, Iowa—50% thru 4 mesh | .85 |
| Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh | 1.00 |
| Ft. Spring, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh | 1.00 |
| Kansas City, Mo. — 50% thru 100 mesh | 1.00 |
| Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh | 2.00 |
| Screenings (¼ in. to dust) | 1.00 |
| Marblehead, Ohio—90% thru 100 mesh | 3.00 |
| 90% thru 50 mesh | 2.00 |
| 90% thru 4 mesh | 1.00 |
| McCook, Ill.—90% thru 4 mesh | .90 |
| Middlepoint, Bellevue, Bloomville, Kenton and Whitehouse, Ohio; Monroe, Mich.; Bluffton, Greencastle and Logansport, Ind.—85% thru 10 mesh, 20% thru 100 mesh | 1.50 |
| Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh | 1.50 |
| Mountville, Va. — Analysis, 76.60% $CaCO_3$; $MgCO_3$, 22.83%, 100% thru 20 mesh; 50% thru 100 mesh, paper bags. 4.50; burlap bags | 5.00 |
| Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh | 1.10@1.70 |
| Stone City, Iowa — Analysis, 98% $CaCO_3$; 90% thru 50 mesh | .75 |
| Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh | 2.05 |
| Valmeyer, Ill.—Analysis, 96% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh | 1.10@1.70 |

## Pulverized Limestone for Coal Operators

| | |
|---|---|
| Davenport, Ia.—Analysis 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; paper sacks | 6.00 |
| Hillsville, Penn., sacks, 4.50; bulk | 3.00 |
| Joliet, Ill. — Analysis, 52% $CaCO_3$; 46% $MgCO_3$; 95% thru 100 mesh; paper bags (bags extra) | 3.50 |
| Marblehead, Ohio — Analysis, 83.54% $CaCO_3$; 14.92% $MgCO_3$; 99.8% thru 100 mesh; sacks | 4.25 |
| Piqua, Ohio, sacks, 4.50@5.00; bulk | 3.00@ 3.50 |
| Rocky Point, Va.—85% thru 200 mesh, bulk | 2.25@ 3.50 |
| Waukesha, Wis.—90% thru 100 mesh, bulk | 4.50 |

## Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

| | |
|---|---|
| Cedarville and S. Vineland, N. J. | *1.75@ 2.25 |
| Estill Springs and Sewanee, Tenn. | 1.50 |
| Franklin, Penn. | 2.00 |
| Klondike, Mo. | 2.00 |
| Massillon, Ohio | 3.00 |
| Michigan City, Ind. | .30@ .35 |
| Ohlton, Ohio | 2.50 |
| Ottawa, Ill. | 1.25 |
| Red Wing, Minn. | 1.50 |
| Rockwood, Mich. | 2.25@ 3.00 |
| San Francisco, Calif. | 4.00@ 5.00 |
| Silica and Mendota, Va. | 2.00 |
| St. Louis, Mo. | 2.00 |
| Utica and Ottawa, Ill. | .75@ 1.00 |
| Zanesville, Ohio | 2.50 |

## Miscellaneous Sands

| City or shipping point | Roofing sand | Traction |
|---|---|---|
| Beach City, Ohio | | 1.50 |
| Dresden, Ohio | | 1.25 |
| Eau Claire, Wis. | 4.25 | |
| Estill Springs and Sewanee, Tenn. | 1.35@1.50 | 1.35@1.50 |
| Franklin, Penn. | | 1.75 |
| Massillon, Ohio | | 2.25 |
| Michigan City, Ind. | | .30 |
| Montoursville, Penn. | | 1.25 |
| Ohlton, Ohio | 1.75 | 1.75 |
| Ottawa, Ill. | 3.25 | 1.25 |
| Red Wing, Minn. | | 1.00 |
| San Francisco, Calif. | 3.50 | 3.50 |

(Continued on next page)

# Wholesale Prices of Sand and Gravel

**Prices given are per ton, F.O.B., producing plant or nearest shipping point**

## Washed Sand and Gravel

| City or shipping point | Fine Sand, 1/10 in. down | Sand, ¼ in. and less | Gravel, ½ in. and less | Gravel, 1 in. and less | Gravel, 1½ in. and less | Gravel, 2 in. and less |
|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | |
| Asbury Park, Farmingdale, Spring Lake and Wayside, N.J. | | .55 | 1.10 | 1.25 | 1.40 | |
| Attica and Franklinville, N. Y. | .75 | .75 | .85 | .75 | .75 | .65 |
| Boston, Mass.‡ | 1.40 | 1.40 | 2.25 | | 2.25 | 2.25 |
| Buffalo, N. Y. | 1.10 | .95 | 1.05 | 1.05 | 1.05 | 1.05 |
| Erie, Penn. | .60 | .80 | | | 1.40 | |
| Leeds Junction, Me. | 1.00 | 1.00 | 2.50 | | 2.25 | |
| Machias Jct., N. Y. | .75 | .65 | .65 | .65 | .65 | .65 |
| Montoursville, Penn. | 1.00 | .75 | .70 | .60 | .60 | .50 |
| Northern New Jersey | .50@ .60 | .50@ .60 | 1.25 | | 1.35 | 1.25 |
| Somerset, Penn. | | 2.00 | | | | |
| Troy, N. Y. | .50@ .75* | .50@ .75* | .80@1.00* | .80@1.00* | | .80@1.00* |
| F. o. b. boat, per yd. | 1.50 | 1.50 | 1.75 | 1.75 | | 1.75 |
| Washington, D. C. | .55 | .55 | 1.20 | 1.20 | 1.00 | 1.00 |
| **CENTRAL:** | | | | | | |
| Algonquin, Ill. | .30* | .20* | .40* | .45* | .50* | .50* |
| Attica, Ind. | | | All sizes .75@.85 | | | |
| Aurora, Moronts, Oregon, Sheridan, Yorkville, Ill. | .50 | .35 | .20 | .50 | .60 | .60 |
| Barton, Wis. | | .40 | .60 | .65 | .65 | .65 |
| Chicago, Ill. | .50 | .50@1.45n | .60 | .60@1.55n | .60 | .60@1.90n |
| Chicago, Ill. | .30 | .20 | .30 | .40 | .40 | .45 |
| Columbus, Ohio¶ | | .65 | .65 | .65 | .65 | |
| Des Moines, Iowa | | .30 | | 1.40 | 1.40 | 1.40 |
| Eau Claire, Chippewa Falls, Wis. | | .40 | .55@ .75 | .85 | .85 | |
| Elkhart Lake, Wis. | .60 | .30 | .50 | .56 | .50 | .50 |
| Ferrysburg, Mich. | | .50@ .80 | .60@1.00 | .60@1.00 | | .50@1.25 |
| Grand Haven, Mich. | | .60@ .80 | .70@ .90 | .70@ .90 | | .70@ .90 |
| Grand Rapids, Mich. | .50 | .50 | .90 | .80 | .70 | .70 |
| Hamilton, Ohio | | 1.00 | 1.00 | | 1.00 | |
| Hersey, Mich. | | .50 | | .60 | .80 | .70 |
| Humboldt, Iowa | .35 | .35 | 1.35 | 1.35 | 1.35 | 1.35 |
| Indianapolis, Ind. | .60 | .60 | | .90 | .75@1.00 | .75@1.00 |
| Mankato, Minn. | | .45g | | .60@1.25h | .70@1.25 | 1.25e |
| Mason City, Iowa | .50 | .50 | 1.25 | 1.25 | 1.25 | 1.25 |
| Mattoon, Ill. | | | .75@.85 all sizes | | | |
| Milwaukee, Wis. | .96 | .91 | 1.06 | 1.06 | 1.06 | 1.06 |
| Minneapolis, Minn. | .15@ .25 | .15@ .25 | .75@1.00 | .75@1.00 | 1.00@1.25 | 1.00@1.25 |
| St. Louis, Mo. | 1.15e | 1.45f | 1.45a | 1.45 | 1.45 | 1.45 |
| St. Paul, Minn. | .35 | .35 | | 1.25 | 1.25 | 1.25 |
| Terre Haute, Ind. | .75 | .60 | .75 | .85 | .75 | .75 |
| Waukesha, Wis. | | .45 | .60 | .60 | .65 | .65 |
| Winona, Minn. | .40 | .40 | 1.50 | 1.25 | 1.10 | 1.10 |
| **SOUTHERN:** | | | | | | |
| Brewster, Fla. | .50 | .50 | 3.00 | 3.00 | | |
| Brookhaven, Miss. | 1.25 | .70 | 1.25 | 1.00 | .70 | .70 |
| Charleston, W. Va. | | | River sand and gravel, all sizes, 1.40 | | | |
| Eustis, Fla. | | .45 | | | | |
| Fort Worth, Tex. | 1.10 | 1.00 | 1.25 | 1.10@1.20 | 1.10 | 1.10 |
| Knoxville, Tenn. | 1.00 | 1.00 | 1.20 | 1.20 | 1.20 | 1.20 |
| Macon, Ga. | .65@ .90 | .65@ .90 | 2.25@2.50 | 2.25@2.50 | 2.25@2.50 | 2.25@2.50 |
| New Martinsville, W. Va. | 1.10 | 1.00 | | 1.30 | 1.10 | .90 |
| Roseland, La. | .35 | .15 | .85 | .85 | .75 | .75 |
| **WESTERN:** | | | | | | |
| Kansas City, Mo. | .70 | .70@ .75 | | | | |
| Crushton, Durbin, Kincaid, Largo, Rivas, Calif. | .10@ .40 | .10@ .40 | .50@1.00 | .50@1.00 | .50@1.00 | .50@1.00 |
| Oregon City, Ore. | 1.25* | 1.25* | 1.25* | 1.25* | 1.25* | 1.25* |
| Otay, Calif. | | .35@ .50 | .50@ .60 | .50@ .60 | .50@ .60 | .50@ .60 |
| Phoenix, Ariz. (k) | 1.25* | 1.15* | 1.50* | 1.25* | 1.15* | 1.10* |
| Pueblo, Colo. | .80 | .60 | | 1.20 | | 1.15 |
| Seattle, Wash. | 1.25* | 1.25* | 1.25* | 1.25* | 1.25* | 1.25* |
| Steilacoom, Wash. | .50 | .50 | .50 | .50 | .50 | .50 |

## Bank Run Sand and Gravel

| City or shipping point | Fine Sand, 1/10 in. down | Sand, ¼ in. and less | Gravel, ½ in. and less | Gravel, 1 in. and less | Gravel, 1½ in. and less | Gravel, 2 in. and less |
|---|---|---|---|---|---|---|
| Algonquin and Beloit, Wis. | | | Dust to 3 in., .40 | | | |
| Brookhaven, Miss. | | | | | | .60 |
| Buffalo, N. Y. | 1.10 | .95 | | .85 | | .85 |
| Burnside, Conn. | .75* | | 1.30 | 1.10 | 1.00 | 1.00 |
| Chicago, Ill. | 1.25m | | | .35 | | |
| Des Moines, Iowa | | | | .60 | | |
| Dresden, Ohio | | | | .70 | .65 | |
| Eau Claire, Chippewa Fls., Wis | | | | | .65 | |
| Fort Worth, Texas | | | | | | .65 |
| Gainesville, Texas | | | | | | .55 |
| Grand Rapids, Mich. | | | | .50 | | |
| Hamilton, Ohio | | | | | 1.00 | |
| Hersey, Mich. | | | | .50 | | |
| Indianapolis, Ind. | | | Mixed gravel for concrete work, at .65 | | | |
| Macon, Ga. | .35 | | | | | |
| Oregon City, Ore. | 1.25* | 1.25* | 1.25* | 1.25* | 1.25* | 1.25* |
| Somerset, Penn. | | 1.85@2.00 | | 1.50@1.75 | | |
| Steilacoom, Wash. | .25 | | | | | |
| St. Louis, Mo. | | | Mine run gravel, 1.35 per ton | | | |
| Summit Grove, Ind. | .50 | .50 | .50 | .50 | .50 | .54 |
| Winona, Minn. | .40 | .40 | .60 | .60 | .60 | .60 |
| York, Penn. | 1.10 | 1.00 | | | | |

*Cubic yd. ‡Delivered on job by truck. (a) ¾-in. down. (b) River run. (c) 2½-in. and less. ¶By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramee River. (g) Washed and screened river sand. (h) ¾-in. to ¼-in. (j) Lake sand, 1.75, delivered. (k) 60-70% crushed boulders. (m) Cu. yd., dune sand, f.o.b. cars, Chicago. (n) Cu. yd., f.o.b. cars, Chicago.

## Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

| City or shipping point | Molding, fine | Molding, coarse | Molding, brass | Core | Furnace lining | Sand blast | Stone sawing |
|---|---|---|---|---|---|---|---|
| Albany, N. Y. | 2.00 | 2.00 | 2.25 | | | 3.75 | |
| Beach City, Ohio | 1.50@2.00 | 1.75@2.00 | | 1.50 | 1.50@1.75 | | 1.50 |
| Dresden, Ohio | 1.25@1.50 | 1.25@1.50 | 1.50@1.75 | 1.00@1.25 | | | |
| Eau Claire, Wis. | | | | | | 3.00 | |
| Elco & Tamms, Ill. | Ground silica per ton in carloads—18.00@31.00 | | | | | | |
| Estill Springs and Sewanee, Tenn. | 1.25 | | | 1.25 | | 1.35@1.50 | |
| Franklin, Penn. | 1.75 | 1.75 | 2.00 | 1.75 | | | |
| Kasota, Minn. | | | | | | | 1.00 |
| Kerrs, Ohio | 1.10@1.50 | 1.25@2.00 | 2.00 | | | 2.75@3.00 | |
| Klondike, Mo. | 2.00 | | | 2.00 | | | |
| Massillon, Ohio | 2.25 | 2.25 | | 2.50 | 2.50 | | |
| Michigan City, Ind. | | | | .30@ .35 | | | |
| Montoursville, Penn. | | | | 1.35@1.60 | | | |
| New Lexington, O. | 2.00 | 1.25 | | | | | |
| Ohlton, Ohio | 2.00 | 2.00 | | 1.75 | 1.75 | 1.75 | |
| Ottawa, Ill. | 1.00 | 1.25 | 1.50 | 1.75 | 1.25 | 3.50 | 2.00 |
| Red Wing, Minn. (d) | | | | | 1.50 | 3.00 | 1.50 |
| San Francisco, Calif.[1] | 3.50† | 5.00† | 3.50† | 3.50@5.00† | 3.50@5.00† | 3.50@5.00† | |
| Silica, Mendota, Va. | | | Potters flint, 8.00@10.00g | | | | |
| Utica & Ottawa, Ill. | .40@1.00f | 40.@1.00f | .75@1.00 | .40@1.00f | .60@1.00f | 2.23@3.25 | 1.00@3.25 |
| Utica, Ill. | .60 | .70 | | .75 | 1.00 | | |
| Warwick, Ohio | 1.50*@2.00h | 2.00h | | 1.50*@2.00h | | | |
| Zanesville, Ohio | 2.00 | 1.50 | 2.00 | 2.50 | 2.00 | | |

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried. 2.50. (d) Filter sand, 3.00. (e) Filter sand, $3.00@4.25. (f) Crude and dry. (g) Also 12.00. (h) Washed, 1.75.

## Crushed Slag

| City or shipping point | Roofing | ¼ in. down | ½ in. and less | ¾ in. and less | 1½ in. and less | 2½ in. and less | 3 in. and larger |
|---|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | | |
| Buffalo, N. Y., Erie and Dubois, Pa. | 2.25 | 1.25 | 1.25 | 1.35 | 1.25 | 1.25 | 1.25 |
| Eastern Penn. | 2.50 | 1.20 | 1.50 | 1.20 | 1.20 | 1.20 | 1.20 |
| Northern N. J. | 2.50 | 1.20 | 1.50 | 1.20 | 1.20 | 1.20 | 1.20 |
| Reading, Penn. | 2.50 | 1.25 | | 1.00 | | | |
| Western Penn. | 2.50 | 1.25 | 1.50 | 1.25 | 1.25 | 1.25 | 1.25 |
| **CENTRAL:** | | | | | | | |
| Ironton, Ohio | | 1.30* | | 1.45* | 1.45* | 1.45* | |
| Jackson, Ohio | 2.05* | 1.05* | 1.80* | 1.30* | 1.05* | 1.30* | |
| Toledo, Ohio | 1.50 | 1.35 | 1.35 | 1.35 | 1.35 | 1.35 | 1.35 |
| **SOUTHERN:** | | | | | | | |
| Ashland, Ky. | 2.05* | 1.45* | 1.80* | 1.45* | 1.45* | 1.45* | 1.45* |
| Ensley and Alabama City, Ala. | 2.05 | .55 | 1.25 | 1.15 | .90 | .90 | .90 |
| Longdale, Roanoke, Ruesens, Va. | 2.50 | 1.00 | 1.25 | 1.25 | 1.25 | 1.15 | 1.15 |
| Woodward, Ala.† | 2.05* | .55* | | 1.15* | .90* | .90* | |

*5c per ton discount on terms. †1¼ in. to ¼ in., $1.05*; ⅝ in. to 10 mesh, $1.25*; ⅝ in. to 0 in., .90*; ¼ in. to 10 mesh, .80*.

## Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

| | Finishing hydrate | Masons' hydrate | Agricultural hydrate | Chemical hydrate | Ground burnt lime, Blk. | Ground burnt lime, Bags | Lump lime, Blk. | Lump lime, Bbl. |
|---|---|---|---|---|---|---|---|---|
| **EASTERN:** | | | | | | | | |
| Berkeley, R. I. | | | 12.00 | | | | | 2.00 |
| Buffalo, N. Y. | 11.50 | 7.50 | 7.50 | 12.00 | 8.00 | 11.00 | 7.50 | 1.50[16] |
| Lime Ridge, Penn. | | | | | | | 5.00 | |
| West Stockbridge, Mass. | 12.00 | 10.00 | 5.60 | | | | | 2.00[12] |
| Williamsport, Penn. | 10.00@11.00 | 8.50@9.00 | 8.50@9.00 | | 7.00 | 9.00 | 5.00 | |
| York, Penn., & Oranda, Va. | 11.50[7] | 8.50@9.50[7] | 8.50@9.50[7] | 8.50@10.50[7] | 8.00 | 9.25 | 7.00 | 1.40[8] |
| **CENTRAL:** | | | | | | | | |
| Afton, Mich. | | | | | 7.50 | | | 1.35 |
| Carey, Ohio | 11.50 | 7.50 | 7.50 | | 8.00 | | 8.00 | 1.50 |
| Cold Springs, Ohio | | 8.00 | 7.50 | | | | 8.00 | |
| Gibsonburg, Ohio | 11.50 | | | | 8.00 | 10.00 | | |
| Huntington, Ind. | 11.50 | 7.50 | 7.50 | 12.00 | 8.00 | 11.00 | 7.50 | 1.50[36] |
| Luckey, Ohio | 11.50 | | | | | | | |
| Milltown, Ind. | | 8.50@10.00 | | 10.00[5] | | | 8.50[22] | 1.35[10] |
| Ohio points | 11.50 | 7.50 | 7.50 | 12.00 | 8.00 | 11.00 | 7.50 | 1.50[16] |
| Scioto, Ohio | 11.50 | 7.50 | 7.50 | 8.50 | 8.25 | .62½ | 7.00 | 1.50 |
| Sheboygan, Wis. | | 10.50 | | | | | 9.50 | 2.00[4] |
| Wisconsin points[6] | | 11.50 | | | | | 9.50 | |
| Woodville, Ohio | 11.50 | 7.50 | 7.50 | 12.50 | 8.00 | 10.00[9] | 8.00 | 1.50[3] |
| **SOUTHERN:** | | | | | | | | |
| El Paso, Texas | | | | | | | 7.00 | 1.50 |
| Frederick, Md. | | 8.00@9.50 | 8.00@9.50 | | | 9.50[15] | 7.00[15] | |
| Graystone & Landmark, Ala. | 12.50 | 9.00 | | | | | 7.00 | 1.35 |
| Keystone, Ala. | 12.50 | 9.00 | 9.00 | 10.00 | | | 8.00 | 1.35 |
| Knoxville, Tenn. | 19.00 | 9.00 | 9.00 | 9.00 | | | 7.50 | 1.35 |
| Ocala, Fla. | 14.00 | 12.00 | 11.00 | 13.00 | | | 11.00 | 1.40 |
| **WESTERN:** | | | | | | | | |
| Kirtland, N. M. | | | | | | | 15.00 | |
| Los Angeles, Calif. | 15.00 | 14.00 | 12.00 | 18.00 | | | 13.50 | |
| San Francisco, Calif. | 19.50 | 16.00 | 12.50 | 16.00@19.50 | 14.50 | .90[17] | 14.50 | 1.85[17] |
| Tehachapi, Calif.[13] | 10.80 | | 6.75[11] | 12.00 | | | 10.30 | |
| Seattle, Wash. | 19.00 | 19.00 | 12.00 | 19.00 | 19.00 | | 18.60 | 2.30 |

[1] Barrels. [2] Net ton. [3] Wooden, steel 1.70. [4] Steel; in bbl. .95. [5] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] In paper bags, including bags. [8] To 11.00. [9]80-lb. [10] To 1.50. [11] Refuse or air slack, 10.00@12.00. [12] To 3.00. [13] Delivered in Southern California. [15] To 8.00. [16] To 1.70. [17] Less credit for return of empties. [22] To 9.00. [30] To 16.50.

## Miscellaneous Sands

(Continued)

| City or shipping point | Roofing Sand | Traction |
|---|---|---|
| Utica & Ottawa, Ill. | 1.00@ 3.25 | .75 |
| Warwick, Ohio | | 2.00 |
| Zanesville, Ohio | | 2.50 |

*Damp.

## Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Crude talc (for grinding) 4.00@50.00
- Ground talc (20-50 mesh), bags 8.00
- Ground talc (150-200 mesh), bags 8.50@15.50
- Pencils and steel crayons, gross 1.00@ 2.00

Chester, Vt.:
- Ground talc (150-200 mesh), paper bags 9.00@10.00
- Same, burlap bags, bags extra 8.00@ 9.00

Chicago and Joliet, Ill.:
- Ground (150-200 mesh), bags 30.00

Cromleys Mt., Md.:
- Crude talc 63.00

Dalton, Ga.:
- Crude talc (for grinding) 5 00
- Ground talc (150-200 mesh), bags 12.00
- Pencils and steel worker's crayons, per gross 1.00@ 2.50

Emeryville, N. Y.:
(Double air floated) including bags;
- 325 mesh 14.75
- 200 mesh 13.75

Hailesboro, N. Y.:
- Ground white talc (double and triple air floated) 200-lb. bags, 300-350-mesh 15.50@20.00

Henry, Va.:
- Crude (mine run) 3.50@ 4.00
- Ground talc (150-200 mesh), bags 7.50@14.25

Joliet, Ill.:
Ground talc (200 mesh) in bags:
- California white 30.00
- Southern white 20.00
- Illinois talc 10.00

Keeler, Calif.:
- Ground (200-300 mesh), bags 20.00@30.00

Natural Bridge, N. Y.:
- Ground talc (300-325 mesh), bags 12.00@15.00

## Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

### Lump Rock

- Columbia, Tenn.—B.P.L. 65-70% 3.50@ 4.50
- Gordonsburg, Tenn.—B.P.L. 65-70% 3.75@ 4.00
- Mt. Pleasant, Tenn.—B.P.L. 72% 5.00@ 5.50
- Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72% 5.00
- B.P.L. 75% 6.00
- Twomey, Tenn.—B.P.L. 65%, 2000 lb. 8.00@ 9.00

### Ground Rock

(2000 lb.)

- Centerville, Tenn.—B.P.L. 65% 8.00
- Gordonsburg, Tenn.—B.P.L. 65-70% 3.75@ 4.50
- Mt. Pleasant, Tenn.—B.P.L. 72% 5.00@ 5.50
- Twomey, Tenn.—B.P.L. 65% 8.00@ 9.00

## Florida Phosphate

### (Raw Land Pebble)

(Per Ton)

- Florida — F.o.b mines, gross ton, 68/66% B.P.L., Basis 68% 3.25
- 70% min. B.P.L., Basis 70% 3.75

## Mica

Prices given are net, f.o.b. plant or nearest shipping point.

- Pringle, S. D.—Mine run, per ton 125.00
- Punch mica, per lb .06
- Scrap, per ton, carloads 20.00
- Rumney Depot, N. H.—Per ton,
- Mine run 300.00
- Clean shop scrap 25.00
- Mine scrap 22.50@24.00
- Roofing mica 37.50
- Punch mica, per lb. .12

Cut mica—50% from Standard List.

## Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

| City or shipping point | Terrazzo | Stucco-chips |
|---|---|---|
| Brandon, Vt. — English pink, English cream and coral pink | ¶12.50@‖14.50 | ¶12.50@‖14.50 |
| Brighton, Tenn.—Pink marble chips | §3.00 | §3.00 |
| Crown Point, N. Y.—Mica spar | | 9.00@10.00 |
| Davenport, Ia.—White limestone, in bags | 6.00 | 6.00 |
| Easton, Penn. | | 8.00@ 9.00 |
| Harrisonburg, Va.—Bulk marble (crushed, in bags) | †12.50 | †12.50 |
| Ingomar, Ohio—Concrete facings and stucco dash | | 11.00@18.00 |
| Middlebrook, Mo.—Red | | 20.00@25.00 |
| Middlebury, Vt.—Middlebury white | ¶9.00@‖10.00 | ¶9.00@‖10.00 |
| Middlebury and Brandon, Vt.—Caststone, per ton, including bags | | 4.00@ 5.50 |
| Phillipsburg, N. J.—Royal green granite | | 16.00@20.00a |
| Randville, Mich.—Crystalite crushed white marble, bulk | 4.00 | 4.00@ 7.00 |
| Rose pink granite, bulk | | 12.00 |
| Stockton, Calif.—"Nat-"rock" roofing grits | | 12.00@20.00 |
| Tuckahoe, N. Y.—Tuckahoe white | 10.00 | |
| Warren, N. H. | | ¶7.90@‖8.95 |
| Wauwatosa, Wis. | | 20.00@32.00 |
| Wellsville, Colo. — Colorado Travertine Stone | 15.00 | 15.00 |

†C.L. L.C.L. 16.00.
§Bulk, car lots, minimum 30 tons.
¶C.L. ‖L.C.L. (a) Including bags.

## Potash Feldspar

| | |
|---|---|
| Auburn and Topsham, Me. — Color white, 98% thru 140-mesh | 19.00 |
| Buckingham, Ore.—White, analysis, $K_2O$, 12-13%; $Na_2O$, 1.75%; bulk | 9.00 |
| De Kalb Jct., N. Y.—Color, white; analysis, $K_2O$, 9.63%; $Na_2O$, 1.01%; $SiO_2$, 69.72%; $Fe_2O_3$, .00%; $Al_2O_3$, 18.6%; bulk (crude) | 9.00 |
| East Hartford, Conn.—Color, white, 40 mesh to 200 mesh | 15.00@28.00 |
| East Liverpool, Ohio—Color, white; 98% thru 200 mesh, bulk | 19.35 |
| Soda feldspar, crude, bulk, per ton | 22.00 |
| Glen Tay Station, Ont.—Color, red or pink; analysis, $K_2O$, 12.81%; crude | 7.00 |
| Keystone, S. D.—White; bulk (crude) | 8.00 |
| Los Angeles, Calif.—Color, white; analysis, $K_2O$, 12.16%; $Na_2O$, 1.53%; $SiO_2$, 65.60%; $Fe_2O_3$, .10%; $Al_2O_3$, 19.20%; Arizona spar, crude, bags, 12.50@14.00; bulk | 11.00@12.50 |
| Pulverized, 95% thru 200 mesh; bags, 19.73@23.50; bulk | 15.75@22.50 |
| Pulverized, 20% thru 80 mesh; bags, 17.60; bulk | 16.50 |
| Murphysboro, Ill.—Color, prime white; analysis, $K_2O$, 12.60%; $Na_2O$, 2.35%; $SiO_2$, 63%; $Fe_2O_3$, .06%; $Al_2O_3$, 18.20%; 98% thru 200 mesh; bags, 21.00; bulk | 20.00 |
| Penland, N. C.—White; crude, bulk | 8.00 |
| Ground, bulk | 16.50 |
| Spruce Pine, N. C.—Color, white; analysis, $K_2O$, 10%; $Na_2O$, 3%; $SiO_2$, 68%; $Fe_2O_3$, 0.10%; $Al_2O_3$, 18%; 99½% thru 200 mesh; bulk (Bags 15c extra.) | 18.00 |
| Crude feldspar, bulk | 9.00 |
| Tenn. Mills—Color, white; analysis $K_2O$, 10%; $Na_2O_3$, 3%; 68% $SiO_2$; 99½% thru 200 mesh; bulk (Bags, 15c extra) | 18.00 |
| Toronto, Can.—Color, flesh; analysis $K_2O$, 12.75%; $Na_2O$, 1.96%; crude | 7.50@ 8.00 |

## Chicken Grits

| | |
|---|---|
| Afton, Mich.(Limestone), per ton | 1.75 |
| Belfast, Me.—(Limestone), per ton | ‡10.00 |
| Chico and Bridgeport, Tex.—Hen | ¶9.00 |
| Baby chick, per ton | ¶8.00 |
| Danbury, Conn.; Adams, Ashley Falls, and West Stockbridge, Mass. (Limestone | ‡7.50@*9.00 |
| Davenport, Ia.—(Limestone) bags, per ton | 6.00 |
| Easton, Penn.—In bags | 8.00 |
| El Paso, Tex.—Per ton | 1.00 |
| Knoxville, Tenn.—Per bag | 1.25 |
| Los Angeles, Calif.—Per ton, including sacks: | |
| Feldspar | 14.00 |
| Gypsum | 7.50 |
| Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag | .50 |
| Middlebury, Vt.—Per ton | 10.00 |
| Randville, Mich.—(Marble), bulk | 6.00 |
| Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk | 5.00 |
| Seattle, Wash.—(Gypsum), bulk, per ton | 10.00 |
| Tuckahoe, N. Y. | 8.00 |
| Waukesha, Wis.—(Limestone), per ton | 8.00 |
| Wisconsin Points—(Limestone), per ton | 15.00 |
| Winona, Minn.—(Limestone), sacked, per ton, $8.00; bulk, per ton | 6.00 |

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags.

## Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

| | |
|---|---|
| Albany, Ga. | 10.00@11.00 |
| Anaheim, Calif. | 10.50@11.00 |
| Barton, Wis. | 10.50g |
| Boston, Mass. | 17.00 |
| Brighton, N. Y. | 19.75* |
| Brownstone, Penn. | 11.00 |
| Dayton, Ohio | 12.50@13.50 |
| Detroit, Mich. | 13.00@16.00*d |
| Farmington, Conn. | 13.00 |
| Flint, Mich. | 18.00† |
| Grand Rapids, Mich. | 12.50 |
| Hartford, Conn. | 14.00@19.00* |
| Jackson, Mich. | 13.00 |
| Lakeland, Fla. | 10.00@11.00 |
| Lake Helen, Fla. | 9.00@12.00 |
| Lancaster, N. Y. | 12.50 |
| Madison, Wis. | 12.00@12.50a |
| Mishawaka, Ind. | 11.00 |
| Milwaukee, Wis. | 13.00* |
| Minneapolis, Minn. | 10.00 |
| New Brighton, Minn. | 10.00 |
| Pontiac, Mich. | 12.50@15.00* |
| Pontiac, Mich. | 12.00 |
| Portage, Wis. | 16.00 |
| Prairie du Chien, Wis. | 18.00@22.50 |
| Rochester, N. Y. | 19.75 |
| Saginaw, Mich. | 13.50 |
| San Antonio, Texas | 12.50@14.00 |
| Sebewaing, Mich. | 12.50 |
| Sioux Falls, S. Dak. | 13.00 |
| South River, N. J. | 13.00 |
| Syracuse, N. Y. | 18.00@20.00 |
| Toronto, Canada (f) | †15.00* |
| Wilkinson, Fla. | 12.00@16.00 |
| Winnipeg, Canada | 15.00 |

*Delivered on job. †5% disc., 10 days. ¶Dealers' price. (a) Less 50c discount per M, 10th of month. (d) 5% disc., 10th of month. (e) Delivered in city limits. (f) F.o.b. yard, 12.50. (g) Delivered Milwaukee, 13.00.

## Portland Cement

Prices per bag and per bbl., without bags, net in carload lots.

| | Per Bag | Per Bbl. |
|---|---|---|
| Albuquerque, N. M. | | 3.70 |
| Atlanta, Ga. | | 2.35 |
| Baltimore, Md. | | 2.25@2.65 |
| Birmingham, Ala. | | 2.10 |
| Boston, Mass. | .68¼ | 2.23@2.73 |
| Buffalo, N. Y. | .62½ | 2.00@2.50 |
| Butte, Mont. | .90⅞ | 3.61 |
| Cedar Rapids, Iowa | | 2.24 |
| Charleston, S. C. | | 2.35 |
| Cheyenne, Wyo. | .64 | 2.56 |
| Chicago, Ill. | .51¼ | 2.05 |
| Cincinnati, Ohio | | 2.22 |
| Cleveland, Ohio | | 2.24 |
| Columbus, Ohio | | 2.22 |
| Dallas, Texas | | 1.80 |
| Davenport, Iowa | | 2.24 |
| Dayton, Ohio | | 2.22 |
| Denver, Colo. | .63¾ | 2.55 |
| Des Moines, Iowa | | 2.05 |
| Detroit, Mich. | | 1.95 |
| Duluth, Minn. | | 2.04 |
| Houston, Texas | | 1.90 |
| Indianapolis, Ind. | .54⅓ | 2.19 |
| Jackson, Miss. | | 2.04 |
| Jacksonville, Fla. | | 2.20 |
| Jersey City, N. J. | | 2.13@2.53 |
| Kansas City, Mo. | | 1.92 |
| Los Angeles, Calif. | .62½ | 2.50 |
| Louisville, Ky. | .55½ | 2.22 |
| Memphis, Tenn. | | 2.04 |
| Milwaukee, Wis. | | 2.20 |
| Minneapolis, Minn. | | 2.12@2.22 |
| Montreal, Que. | | 1.60 |
| New Orleans, La. | | 2.07 |
| New York, N. Y. | .60¾ | 1.93@2.43 |
| Norfolk, Va. | | 2.07 |
| Oklahoma City, Okla. | | 2.46 |
| Omaha, Neb. | | 2.36 |
| Peoria, Ill. | | 2.22 |
| Philadelphia, Penn. | | 2.11@2.61 |
| Phoenix, Ariz. | | 3.91* |
| Pittsburgh, Penn. | | 2.04 |
| Portland, Colo. | | 2.80 |
| Portland, Ore.‡ | | 2.90a |
| Reno, Nev. | | 2.91 |
| Richmond, Va. | | 2.40@2.80 |
| Salt Lake City, Utah | .70¼ | 2.81 |
| San Francisco, Calif. | | 2.21 |
| Savannah, Ga. | | 2.50 |
| St. Louis, Mo. | | 1.95 |
| St. Paul, Minn. | | 2.12@2.22 |
| Seattle, Wash. | | 2.50† |
| Tampa, Fla. | | 2.25 |
| Toledo, Ohio | | 2.20 |
| Topeka, Kan. | | 2.41 |
| Tulsa, Okla. | | 2.33 |
| Wheeling, W. Va. | | 2.12 |
| Winston-Salem, N. C. | | 2.29 |

Mill prices f.o.b. in carload lots, without bags, to contractors.

| | Per Bag | Per Bbl. |
|---|---|---|
| Albany, N. Y. | .43¾ | 1.75 |
| Bellingham, Wash. | | 2.10 |
| Buffington, Ind. | | 1.80 |
| Chattanooga, Tenn. | | 2.45* |
| Concrete, Wash. | | 2.35 |
| Davenport, Calif. | | 2.05 |
| Hannibal, Mo. | | 1.90 |
| Hudson, N. Y. | | 1.75 |
| Leeds, Ala. | | 1.65 |
| Lime and Oswego, Ore. | | 2.50‡ |
| Mildred, Kan. | | 2.35 |
| Nazareth, Penn. | | 2.15 |
| Northampton, Penn. | | 1.75 |
| Richard City, Tenn. | | 2.05 |
| Steelton, Minn. | | 1.85 |
| Toledo, Ohio | | 2.20 |
| Universal, Penn. | | 1.80 |

NOTE—Add 40c per bbl. for bags.
*Includes sacks. ‡10c discount, 15 days.
†10c discount 10 days.
(a) Includes cloth sacks returnable at 10c each.

## Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

| | Crushed Rock | Ground Gypsum | Agricultural Gypsum | Stucco Calcined Gypsum | Cement and Gauging Plaster | Wood Fiber | Gauging White | Plaster Sanded | Cement Keene's | Finish Trowel | —Plaster Board— ½x32x 36". Per M Sq. Ft. | ½x32x 36". Per M Sq. Ft. | Wallboard, ⅜x52 or 48". Lengths 6'-10'. Per M Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acme, Tex. | 1.70 | 4.00 | 4.00 | 4.00 | 4.00 | 4.50 | | | | | | 15.00 | 20.00 |
| Arden, Nev., and Los Angeles, Calif. | 3.00 | 8.00u | 8.00u | 10.70u | 10.70u | | | | | 11.70u | | | |
| Blue Rapids, Kan. | 1.70 | 4.00 | | | | | 10.00 | | | | | 15.00 | 20.00 |
| Centerville, Iowa | 3.00 | 10.00 | 15.00 | 10.00 | 10.00 | 10.50 | 13.50 | | | 13.50 | | | |
| Des Moines, Iowa | 3.00 | 8.00 | 9.00 | 10.00 | 10.00 | 10.50 | 13.50 | 12.00 | 24.00 | 22.00 | 18.00 | 21.00 | 30.00 |
| Detroit, Mich. | | | | | 14.30o | 12.30m | | m9.00@11.00o | | | | | |
| Delawanna, N. J. | | | | | | | | 7.25 | | | 13.00 | 14.00 | |
| Douglas, Ariz. | | | 6.00 | 14.50 | 15.00 | | 18.00 | | 30.00 | | | | |
| Fort Dodge, Iowa | 1.70 | 4.00 | 6.00 | 9.00 | 9.00 | 9.50 | | | | 19.00 | 15.00 | 20.00 | 20.00 |
| Grand Rapids, Mich. | 2.65 | 4.00 | 6.00 | 6.00 | 9.00 | 9.00 | 17.65 | | 22.75 | 19.00 | 12.00 | 15.00 | 18.00 |
| Gypsum, Ohio | 1.70@3.00 | 4.00 | 6.00 | 7.00@9.00 | 9.00 | 9.00 | 19.00 | 7.00 | 24.50 | 19.00 | | 15.00 | 20.00@25.00 |
| Los Angeles, Calif. | 5.00 | 7.50m | 7.50m | 8.00o | 11.00m | | | | | 11.00m | | | 27.50v |
| Medicine Lodge, Kan. | 1.70 | 4.00 | | | | | | | 15.00 | | | 15.00 | 20.00 |
| Oakfield, N. Y. | 2.50 | | | 6.00 | 8.00 | 8.00 | | 6.50 | | | | | |
| Port Clinton, Ohio | 3.00 | 4.00 | 6.00 | 10.00 | 9.00 | 9.00 | 21.00 | | 30.15 | 20.00 | | 20.00 | 30.00 |
| Portland, Colo. | | | | 10.00 | | | | | | | | | |
| San Francisco, Calif. | | | 9.00 | 13.40 | 14.40 | | 15.40 | | | | | | |
| Seattle, Wash. (b) | 6.00 | 10.00 | 10.00 | 13.00 | | | | | | | | | |
| Sigurd, Utah | | | | | | | | | 21.50 | | | | |
| Winnipeg, Man. | 5.50 | 5.00 | 7.00 | 13.00 | 14.00 | 14.00 | | | | | 20.00 | 25.00 | 33.00 |

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable). (a) Hardwall plaster, 13.00; casting, finishing, molding, 14.00
(b) Calacoustic plaster 10.00 at mill; (m) includes paper bags; (o) includes jute sacks; (u) includes sacks. (v) retail 35.00.

# Market Prices of Cement Products

## Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

| City or shipping point | Sizes 8x8x16 | 8x10x16 | 8x12x16 |
|---|---|---|---|
| Camden, N. J. | 17.00 | | |
| Cement City, Mich. | | 5x8x12—55.00¶ | |
| Chicago District¶ | 180.00@210.00a | 230.00@260.00a | 280.00@330.00a |
| Columbus, Ohio | 16.00 | | |
| Detroit, Mich. | .15@ .17† | | .24@.26† |
| Forest Park, Ill. | 21.00* | | |
| Grand Rapids, Mich. | 15.00* | | |
| Graettinger, Iowa | .16@ .18 | | |
| Indianapolis, Ind. | .10@ .12a | | |
| Los Angeles, Calif. | 4x8x12—5.00* | | |
| Olivia and Mankato, Minn. | 9.50b | | |
| Somerset, Penn. | .18@ .20 | | |
| Tiskilwa, Ill. | .16@ .18† | | |
| Yakima, Wash. | 20.00* | | |

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton. (c) Plain. (d) 5x8x12—65.00 M, 5½x8x12—68.50 M.

## Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

| | |
|---|---|
| Camden and Trenton, N. J.—8x12, per sq. | |
| Red | 15.00 |
| Green | 18.00 |
| Chicago, Ill.—Per sq. | 20.00 |
| Detroit, Mich.—5x8x12, per M | 67.50 |
| Houston, Texas—Roofing Tile, per sq. | 25.00 |
| Indianapolis, Ind.—9x15-in. | Per sq. |
| Gray | 10.00 |
| Red | 11.00 |
| Green | 13.00 |
| Waco, Texas: | Per sq. |
| 4x4 | .60 |

## Cement Building Tile

| | |
|---|---|
| Cement City, Mich: | |
| 5x8x12, per 100 | 5.00 |
| Chicago District (Haydite): | |
| 4x 8x16, per M | 130.00 |
| 8x 8x16, per M | 200.00 |
| 8x12x16, per M | 275.00 |
| Columbus, Ohio: | |
| 5x8x12, per 100 | 6.50 |
| Detroit, Mich.: | |
| 5½x8x12, per M | 75.00 |
| Grand Rapids, Mich.: | |
| 5x8x12, per 100 | 8.00 |
| Longview, Wash.: | |
| 4x6x12, per 100 | 5.00 |
| 4x8x12, per 100 | 6.25 |
| Mt. Pleasant, N. Y.. | |
| 5x8x12, per M | 78.00 |
| Houston, Texas: | |
| 5x8x12 (Lightweight), per M | 80.00 |
| Pasadena, Calif. (Stone Tile): | Per 100 |
| 3½x4x12 | 3.00 |
| 3½x6x12 | 4.00 |
| 3½x8x12 | 5.50 |
| Tiskilwa, Ill.: | Per 100 |
| 8x8 | 15.00 |
| Wildasin Spur, Los Angeles, Calif. (Stone-Tile): | Per 1000 |
| 3½x6x12 | 50.00 |
| 3½x8x12 | 60.00 |
| Prairie du Chien, Wis.: | |
| 5x8x12 | 82.00 |
| 5x4x12 | 46.00 |
| 5x8x 6 (half-tile) | 41.00 |
| 5x8x10 (fractional) | 82.00 |
| | Each |
| Yakima, Wash. (Building Tile): | |
| 5x8x12 | .10 |

## Cement Drain Tile

| | |
|---|---|
| Graettinger, Iowa.—Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .13; 12-in., .17½; 14-in., .25; 16-in., .32; 18-in., .40; 20-in., .50; 24-in., .80; 26-in., 1.00; 28-in., 1.10; 30-in. | 1.25 |
| Longview, Wash.—Drain tile, per foot: 3-in., .05; 4-in., .06; 6-in., .10; 8-in., .15; 10-in. | .20 |
| Olivia and Mankato, Minn.—Cement drain tile, per ton | 8.00 |
| Tacoma, Wash.—Drain tile, per M: | |
| 3 in. | 40.00 |
| 4 in. | 50.00 |
| 6 in. | 75.00 |
| 8 in. | 100.00 |
| Waukesha, Wis.—Drain tile, per ton | 8.00 |

## Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

| | Common | Face |
|---|---|---|
| Appleton, Minn. | 22.00 | 25.00@40.00 |
| Baltimore, Md. (Del. according to quantity) | 15.50 | 22.00@50.00 |
| Camden and Trenton, N. J. | 17.00 | |
| Chicago District | 14.00 | |
| Columbus, Ohio | 16.00 | 17.00 |
| El Paso, Tex. — Clinker | 13.00 | 13.00 |
| Ensley, Ala. ("Slagtex") | 9.00@12.00 | |
| Eugene, Ore. | 25.00 | 35.00@75.00 |
| Forest Park, Ill. | | 37.00 |
| Friesland, Wis. | 22.00 | 32.00 |
| Longview, Wash.* | 15.00 | 22.50@65.00 |
| Los Angeles, Calif. | 12.50 | |
| Milwaukee, Wis. | 14.00 | 30.00 |
| Mt. Pleasant, N. Y. | | 14.00@ 23.00 |
| Omaha, Neb. | 18.00 | 30.00@ 40.00 |
| Pasadena, Calif. | 10.00 | |
| Philadelphia, Penn. | 14.75 | |
| Portland, Ore. | 17.50 | 23.00@ 55.00 |
| Mantel brick—100.00@150.00 | | |
| Prairie du Chien, Wis. | 14.00 | 22.50@ 25.00 |
| Rapid City, S. D. | 18.00 | 30.00@ 35.00 |
| Waco, Texas | 16.50 | 32.50@125.00 |
| Watertown, N. Y. | 20.00 | 35.00 |
| Westmoreland Wharves, Penn. | 14.75 | 20.00 |
| Winnipeg, Man. | 14.00 | 22.00 |
| Yakima, Wash. | 22.50 | |

*40% off List.

## Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

| Culvert and Sewer | 4 in. | 6 in. | 8 in. | 10 in. | 12 in. | 15 in. | 18 in. | 20 in. | 22 in. | 24 in. | 27 in. | 30 in. | 36 in. | 42 in. | 48 in. | 54 in. | 60 in. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detroit, Mich. | | | | | | | | 15.00 per ton | | | | | | | | | |
| Detroit, Mich. (c) | | | | | | | | | | | | | | | | | |
| Sewer | .10 | .12 | .22 | .30 | .40 | .60 | .90 | 1.20 | ..... | 1.75 | 2.00 | 2.50 | 3.30 | 4.50 | 5.75 | 6.50 | 8.00 |
| Culvert | ..... | ..... | ..... | ..... | .95 | 1.25 | 1.60 | ..... | ..... | 2.25 | 2.50 | 3.00 | 3.50 | 5.00 | 6.50 | 8.00 | 10.00 |
| Grand Rapids, Mich. | 4 in. to 12 in., 72% off standard sewer price list; 15 in., 65% off; 18 in. to 24 in., 62% off; 27 in. to 36 in., 60% off | | | | | | | | | | | | | | | | |
| Houston, Texas | ..... | .19 | .28 | .43 | .55½ | .90 | 1.30 | ..... | 1.70† | 2.20 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Indianapolis, Ind. (a) | ..... | ..... | ..... | .75 | .85 | .90 | 1.15 | ..... | ..... | 1.60 | ..... | 2.50 | ..... | ..... | ..... | ..... | ..... |
| Longview, Wash. | Sewer pipe 40% off list; culvert—list | | | | | | | | | | | | | | | | |
| Mankato, Minn. (b) | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1.50 | 1.75 | 2.50 | 3.25 | 4.25 | ..... | ..... | ..... |
| Newark, N. J. | 6 in. to 24 in., $18.00 per ton | | | | | | | | | | | | | | | | |
| Norfolk, Neb. (b) | ..... | ..... | ..... | .90 | 1.00 | 1.13 | 1.42 | ..... | ..... | 2.11 | ..... | 2.75 | 3.58 | ..... | 6.14 | ..... | 7.78 |
| Olivia, Mankato, Minn. | 12.00 per ton | | | | | | | | | | | | | | | | |
| Paullina, Iowa‡ | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2.25 | ..... | 2.11 | ..... | 2.75 | 3.58 | ..... | 6.14 | ..... | 7.78 |
| Somerset, Penn. | ..... | ..... | ..... | ..... | 1.08 | 1.25 | 1.65 | ..... | ..... | 2.50 | ..... | 3.65 | 4.85 | 7.50 | 8.50 | ..... | ..... |
| Tiskilwa, Ill. (rein.) | ..... | ..... | ..... | .75 | .85 | .95 | .70 | 1.55 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Tacoma, Wash. | .15 | .18 | .22½ | .30 | .40 | .55 | .75 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Wahoo, Neb. (b) | ..... | ..... | ..... | ..... | .95 | ..... | 1.27 | ..... | ..... | 2.01 | ..... | 2.73 | 3.78 | 4.58 | 6.24 | 7.19 | 8.11 |
| Yakima, Wash. | ..... | ..... | ..... | ..... | ..... | ..... | 1.42 | ..... | ..... | 2.11 | ..... | 2.75 | 3.58 | 4.62 | 6.14 | 6.96 | 7.78 |

(a) 24-in. lengths. (b) Reinforced. (c) Delivered on job; 5% discount, 10th of month. †21-in. diam. ‡Price per 2-ft. length.

## Recent Contract Prices

CONTRACTS recently let for bids received on rock products are as follows:

**Granville, Ill.**—The village board let a contract to the Colby Gravel Co. of Granville for gravel to cover nearly thirty blocks at $2.10 per cu. yd.

**Chicago, Ill.**—City engineer awarded contract to the Construction Materials Co., Chicago, for 5,000 tons of gravel at $1.50 per ton. Another contract went to Material Service Corp., Chicago, for 5,000 tons stone at $1.59 per ton.

## Cuban Gypsum Deposit Eyed by Florida Interests

JUST southwest of Havana, Cuba, 40 miles, and rising in a great bluff on the coast, is a deposit of gypsum estimated to contain not less than 20,000,000 to 25,000,000 tons. This deposit is privately owned but can be mined only under government royalty regulations. It has been known to certain people in St. Petersburg and L. R. Connolly, industrial and transportation commissioner, has been in communication with officials of the United States Gypsum Co. with a view to the building of a gypsum plant in this city, the raw material to come from the Cuban deposit.

The U. S. Gypsum Co. now owns and operates plants in all parts of the United States, and another plant in Florida would round out this chain of operations, Mr. Connolly has pointed out.

Only very recently the Gypsum corporation wrote a letter saying that its research men had completed a survey of the deposits and conditions for the building of a plant here, but found the differential in costs not encouraging in the face of supplies from elsewhere.

If Canadian raw gypsum has to pay a duty of $1.40 to market her deposit in this country the tariff may make a difference in relative costs. It is the hope of local people that the Cuban supply may again be brought under cost surveys.

The Cuban deposit is 99.80 pure. Samples are on display at Mr. Connolly's office in the city hall.

## South Dakota State Cement Plant Has a Surplus

GEORGE PHILIP, chairman of the South Dakota state cement commission, announced recently that the commission has authorized payment to the state treasurer of a quarter million dollars.

The last session of the legislature provided that if at any time there should be accumulation of surplus funds in the cement plant fund, the money could be returned to the state treasurer to be applied toward retiring the cement plant bonds. This quarter million dollars is the first money turned back to be applied on the $2,000,000 bonds. The plant previously paid back $275,000 which had been appropriated by the legislature in 1925.

"Officials at the state cement plant are pleased with the loyal support being given to the plant by the people of the state," Mr. Philip said, pointing out that over a quarter million barrels have already been shipped during 1928, which is greater than the January to July business of any year in the history of the plant. "Indications are that business for the balance of 1928 will be as good as the first half of the year," the chairman said. "According to all standard tests the product of this mill is a first class cement without a superior."

The resolution of the commission turning back the money reads:

"It appearing to the commission that surplus funds have accumulated in the cement plant fund which are not needed in the necessary operation and maintenance of the cement plant; and

"It appearing that the amount of a quarter of a million dollars should be turned over to the proper fund in the state treasurer's office;

"Therefore, be it resolved by the state cement commission that the secretary-treasurer is hereby directed to requisition from the cement plant fund the amount of a quarter million dollars and to return the same at the end of the fiscal year to the state treasurer, to be credited to the cement plant interest and sinking fund to be applied to the payment of the interest and final redemption of the cement plant bonds."

The statement of the plant shows that after having paid $250,000 on the sinking fund there was $292,480.37 in current assets, consisting of $185,626.90 in cash, $10 in petty cash and $106,843.47 in accounts receivable, together with a surplus of $29,342.02.

Strict methods of accountancy were used in the matter of figuring depreciation, Mr. Bowler pointed out. The statement showed that $326,094.94 has been charged off in the reserve for depreciation account and $8292.25 in reserve for depletion.

In the report of L. H. Sohn, of the state division of audits and accounts, it was shown that of the accounts receivable, or money due the plant, amounting in all to more than $106,000, of this 8.37% were accounts of 15 days and less than 30 days, 39.64% were accounts of 30 days and less than three months, 48.67% were three months and over but less than six months, and 3.32% were six months and over.

The plant enjoyed a very large increase in production and sales, the report showed, and the bin cost per barrel of cement was reduced in the past year from $1.07358 to $1.02542, or very nearly 5 cents.—*Sioux Falls* (S. D.) *Argus-Leader.*

## Pacific Coast Cement Co. Plant 60% Completed

SEATTLE'S new cement plant is 60% complete according to Wylie Hemphill, vice-president of the Pacific Coast Cement Co. It is expected that "Diamond" portland cement, the first product of the mill will be on the market early in December.

The 200-ft. stack, made entirely of concrete was completed the last week in August. The 240-ft. rotary kilns are now being put in place and one of the three 45-ft. compartment mills is completely installed.

Contractors working at present on the plant are: chimney, Rust Engineering Co.; sewer, Joe Coluccio; concrete work, Peter Gjarde; machinery, Associated Contracting Co.; fixtures, Cascade Fixture Co.; wharf, McEachern Construction Co.; blinds, Western Venetian Blind Co.; electrical contractor, Meacham & Babcock; dust precipitator, Western Precipitation Co.; railroad spurs, Pacific Coast Railroad Co.

Work on the bag house and concrete silos will be started soon.—*Seattle* (Wash.) *Herold.*

The first cargo of lime rock from the company's quarries on Dall Island, southeastern Alaska, will arrive in Seattle about October 1. The lime rock will be discharged at the plant of the cement company, now building on the East Waterway.

The steamship *Eastern Coast,* one of the two steel freighters purchased on the Atlantic Coast from the Shipping Board by the Pacific Coast Cement Co. for service between Seattle and Dall Island, is due in Seattle tomorrow. The vessel is to be rechristened and given the name of *Diamond Cement.*

N. D. Moore, vice-president of the Pacific Coast Cement Co., announced recently that the alterations and overhauling necessary to convert the *Eastern Coast* into a lime-rock carrier will be done by the Pacific Coast Engineering Co. The vessel is expected to be ready to sail on her first voyage to Alaska about September 15.

The *Eastern Coast* left Baltimore July 10 and has discharged cargo in San Pedro and Portland, en route to Seattle. She has shipments of blacksmith coal and steel for Seattle. The vessel is being brought to Seattle by Capt. A. J. Borkland, with R. B. Ross as chief engineer and Oscar Peterson, chief officer.—*Seattle* (Wash.) *Alaska Weekly.*

## Home Industry Gets Local Contract by Courtesy of Competitor

A SUBSTANTIAL AMOUNT of the cement to be used in the building of the $3,000,000 plant of the Tampa Union Terminal Co., Tampa, Fla., under construction in the Estuary, will be furnished by the Florida Portland Cement Co. there, is was announced in a statement issued by Clyde Perry, president of the terminal company, and S. W. Storey, vice-president of the cement company.

Contract for the entire supply of cement was given to the Alabama Portland Cement Co. "due to a misunderstanding in the negotiations" between the Tampa cement company and the terminal company, it was stated.

"This misunderstanding has now been cleared up and through the courtesy of the Alabama Portland Cement Co., it has been possible for us to arrange to have a substantial amount of the cement required furnished by the Florida Portland Cement Co. at the contract price and on the same terms," the statement said.

There has been considerable discussion of the awarding of the contract for the cement to an outstanding concern by business men and others who felt that the business should have been given to the Tampa company.

It was because of this discussion that the officials of the companies deemed it advisable to issue the statement, they said.—*Avon Park* (Fla.) *Sun.*

## Iowa Road Contractor Opening a Quarry

THE WORK of removing the surface soil from the quarry site, one half mile south of Howe, Iowa, which is to furnish crushed rock for Primary 25 north of Greenfield has been started by Falcon Reinking, Inc. of Cedar Rapids.

The quarry, which is said by the contractors to be satisfactory is located on the Jim Chambers farm, one-half mile south of Howe.

The Reinking company is installing new machinery at the quarry site for the purpose of breaking it in before they move to a large ballast job in Missouri.

The crusher they are installing is of the latest type with a capacity of 450 cu. yd. of crushed rock a day. They expect to average an output of 300 yd. of crushed rock a day.

The rock at this point is 26 ft. in depth and 1100 ft. wide. There is enough rock in this one quarry, according to L. M. McKinley, resident highway engineer, state highway department, to improve all the roads in Adair county with some to spare.

The company expected to begin hauling the crushed rock on the road by September.—*Greenville* (Ia.) *Free Press.*

# New Machinery and Equipment

## High-Pressure Oil Forge

THE GARDNER-DENVER CO., Denver, Colo., has announced a new high-pressure drill-steel forge, designated as "Model DF-1." The principal feature of this new oil forge, according to the manufacturer's announcement, is its practically noiseless operation. When the furnace is running at a forging temperature of 2200 deg. F., the

*New high-pressure oil forge for drill steel*

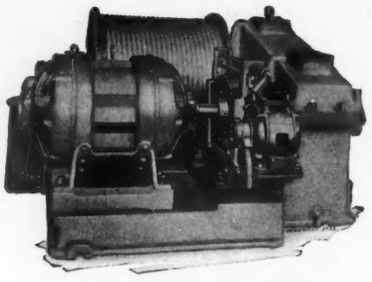
company states, conversation in an ordinary tone of voice can be carried on directly in front of it, which is indicative of its quiet operation in comparison with the usual high pressure system. The operator is protected from the intense heat by a water cooled shield and air screen. The lining of the furnace is composed entirely of standard dimension fire brick with the exception of the ten top bricks forming the throat, which can easily be cut from standard brick or can be supplied molded to dimension, it is stated.

## New Internal Combustion Engine

THE CLIMAX ENGINEERING CO. of Clinton, Iowa, has announced the addition of a new model to its present industrial line of internal conbustion engines. This engine is claimed to be a new development in design and construction and has been called the "Blue Streak," to symbolize its remarkably outstanding performance. New ranges of power, new fuel economy, and new operating flexibility is claimed by the manufacturer. The new engine is a 4-cylinder, 6x7-in. valve-in-head unit. It has produced 110 hp. at 1200 r.p.m. on block tests according to the announcement. To the industrial manufacturers of powered equipment, this new engine is said to offer a wide range of power coupled with exceptional economies in fuel consumption.

## Improved Skip Hoist Winding Machine

R. H. BEAUMONT CO., Philadelphia, Penn., have recently announced a new improved skip hoist winding machine. The new winder is said to be more compact and durable than previous ones, and to embody



*Skip hoist winding machine has new features*

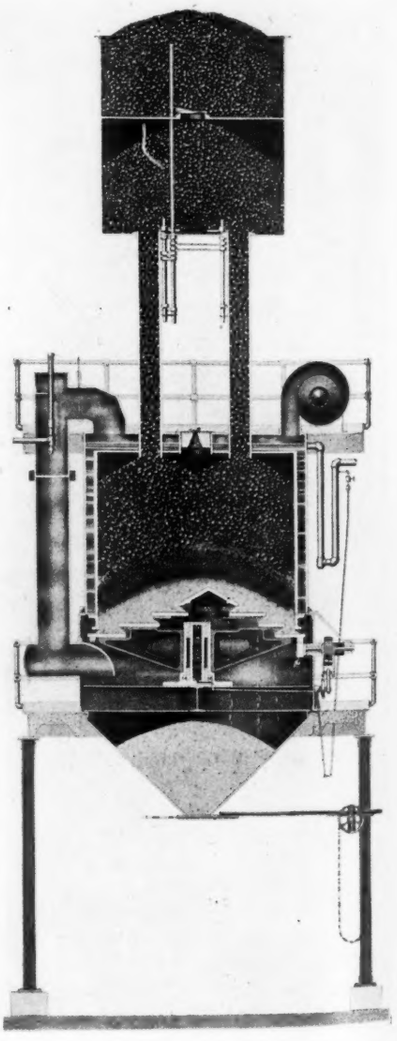
many new features. According to the announcement, the highest grade roller bearings are used, resulting in long life and specially quiet operation. The new skip winder reflects in its design the company's 20 years of experience in manufacturing skip hoists, and is claimed to embody all of the latest improvements to be found in the field.

## New Producer Gas Unit

DOVER BOILER WORKS, New York City, has announced a new water-jacketed producer, which the announcement states has particularly efficient rotary grates. These grates have no perforations through which extremely fine fuel might be wasted, and the elimination of water seals makes it practicable to carry blast pressures of several pounds, if necessary, to overcome the resistanec of very fine fuels, according to the makers.

The waste heat in the water jackets generates the steam for making gas, and the company claims this saves a dollar or more per ton of fuel gasified. It is stated that efficiencies up to 93% are obtained by this conservation of heat, and at the same time labor economy is effected because the clinker does not build up on the smooth water-cooled steel walls. Repair costs are cut down because there are no moving parts in the fuel feed. Also the announcement states that no investment is necessary for boiler plants or refractory linings, and that ample coal and ash bins are included with the unit. The bin compartments are separated by a gas-tight gate and similar gates cover the top of each riser. Normally the riser gates are open, but are closed to permit coal to fill the lower bin. A simple interlock prevents opening either the upper or the lower gate where the other is also open.

Besides its extreme simplicity, this fuel feed contributes valuable elements of producer efficiency, it is claimed. The producer is kept full of fuel which is continuously preheating. This conserves heat and keeps the offtake gas unusually cool, the announcement states. Clean gas is produced because the smooth even fuel flow creates no dust turbulence in the gas stream. In many cases it is possible to dispense with scrubbing tow-



*Sectional view of new producer gas unit*

ers, baffles, water connections and cold gas pumps and to carry hot gas under pressure direct to the burners, according to the manufacturers.

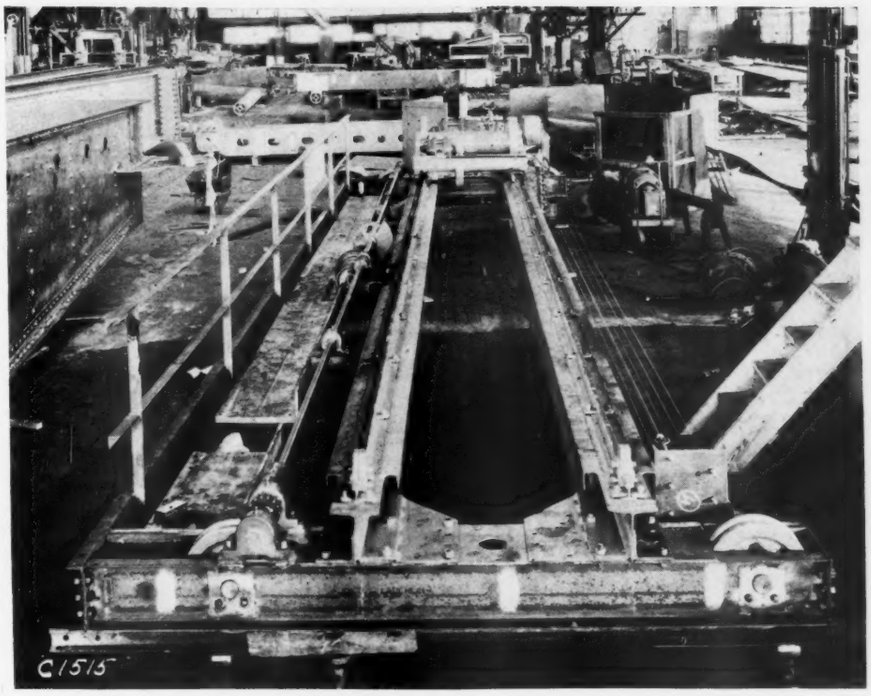
The grates comprise three heavy circular steel discs, flat, and without perforations. They are set one above the other with the edges overlapping so that ash cannot escape unless pushed through the vertical space between the discs. The grates are set eccentric with the center support, and the entire assembly is rotated very slowly. Because of this eccentricity the space between the grate plates and the producer shell varies constantly as the grates revolve. As this space increases it fills with ash, and as it decreases ash is crowded against the bosh. In the sector of greatest eccentricity ash and clinker is crushed between the bosh and the grate plates, broken up, and pushed through the spaces between the grates. This action occurs progressively throughout the entire grate area, delivering a constant stream of loose ash to the storage hopper.

## New Design of Arc Welded Crane

THE Cleveland Crane and Engineering Co., Wickliffe, Ohio, has announced a new design of overhead traveling crane in which the bridge girders and trucks and trolley are constructed by arc welding. One illustration shows a 5 ton, 38 ft. 9¼ in. span of the I-beam girder type. Each girder is reinforced throughout its entire length by angles arc-welded to the standard I-beam sections. Riveted girders of similar construction would employ a channel section instead of the two angles. However, this extra material would not give as great strength or rigidity, it is claimed.

The girders are attached to the end trucks by the notched or shoulder construction designed to prevent weaving. To facilitate shipping the girders and trucks are disassembled. The field connection is made by bolts, but additional arc-welded reinforcement is recommended to secure maximum rigidity. The end trucks themselves are built up of two standard channel sections joined by arc welding. Roller bearings are used on this crane, permitting rapid acceleration and lower power consumption.

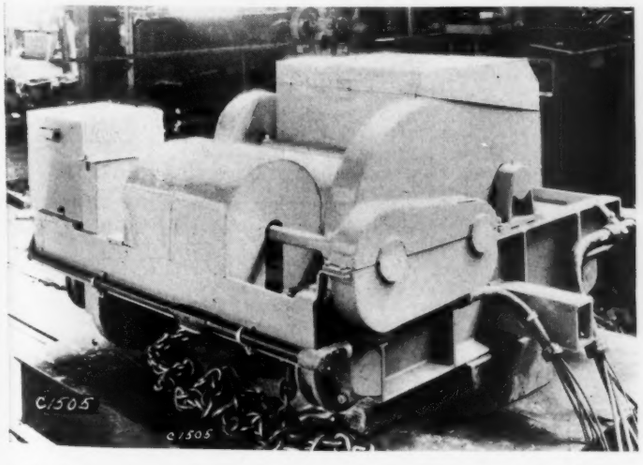
Two small standard arc-welded trolleys are also illustrated. Each trolley frame is made of a standard channel with arc-welded braces under each bearing point. Gear guards are arc welded, as is also the hand rail on the foot bridge and the bearing supports for the bridge drive shafts, all welding on this crane being done by the "Stable-Arc" process on machines furnished by the Lincoln Electric Co. of Cleveland, Ohio. The advantage claimed for arc-welded crane construction, other than greater rigidity and strength, is that a more efficient distribution of weight is possible, thus making it possible to lighten certain moving parts.



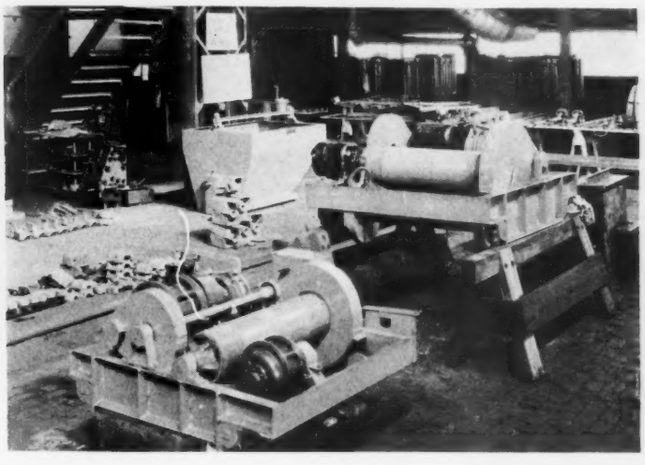

*New arc-welded overhead traveling crane ready for installation*

## New Protective Cream

THE research laboratories of the General Electric Co. have developed a protective hand cream which is furnished as a safety measure to those men in G. E. plants whose hands and arms are exposed to oil, grease, dirt, varnish, paint and other causes of skin discoloration and irritation encountered in industrial processes. It is applied before beginning work and forms an invisible film which quickly dries and is not slippery. Subsequent washing in warm water quickly removes the film and with it the stains which otherwise fill the pores of the skin and are difficult to remove, and likely to cause infection. This cream has now been placed on the market by the G. E. merchandise department at Bridgeport. It is packed in tubes for individual use and also in 1-lb. cans.




*Trolley of arc-welded construction for new traveling crane*



*The trolleys are made up of standard channel units*

# News of All the Industry

## Incorporations

**Victory Gravel Co.**, Shreveport, La.

**Reef Rock Asphalt Co.**, 7104 Spruce St., New Orleans, La., $10,000. John W. Farmer.

**Joplin Sand and Gravel Co.**, Joplin, Mo., chartered to do business in Kansas.

**Doud Concrete Products, Inc.**, Saranac Lake, N. Y., $60,000. F. B. Cantwell, Saranac Lake.

**Leaside Sand Products, Ltd.**, Toronto, Can., $40,000. To mine and deal in sand and gravel, lime, cement, cement blocks, etc.

**Morrison Gravel Co.**, Cleveland, Miss., $30,000. Julian K. Morrison, W. V. Morrison, L. W. Morrison, A. M. Morrison, T. B. Wilson.

**Southern Sand and Gravel Co.**. Bainbridge, Ga., $60,000. H. D. Trawick, Chas. A. Goldsmith, Leon county, Fla.; Gordon Chason, Bainbridge, Ga.

**S. C. Sand and Gravel Co.**, Ventura, Calif., $75,000. Mike Lang, Los Angeles; J. T. Raleigh, Ventura; Howard Lang, Los Angeles.

**Humbolt Gravel and Tile Co.** (home address, Humbolt, Iowa), chartered to do business in Wisconsin. Concrete snow fence and cribbing.

**Long Island Nustone Co.**, Hicksville, N. Y. W. S. Miller, 155 Noble St., Brooklyn, N. Y. Cement products.

**Central Sand and Gravel Co.**, Columbus, Ohio, 2000 shares, no par; $200,000, preferred. J. A. Menduni.

**Cherokee Building Material Co.**, Wilmington, Del., $75,000. Corporation Trust Co. of America, Wilmington.

**Union County Brick-Crete Block Co.**, Elizabeth, N. J., 1000 shares common, no par. Charles A. Otto, Jr., Elizabeth. Cement products.

**South Georgia Gravel Co.**, Leesburg, Fla., $10,000. Knox Nurger, W. H. Horton, Chas. P. Lowell.

**Standard Stone Tub Corp.**, Brooklyn, N. Y., 100 shares common, no par. W. S. Miller, 155 Noble St., Brooklyn, N. Y. Cement products.

**Southwest Stone Co.**, Chico, Texas, $60,000. W. F. Wise, H. C. Perry. Taking over properties of bankrupt Chico Stone Products Co.

**Liberty Quarries and Construction Co.**, Kansas City, Mo. Sidney Turoff, 608 Forrest St., Kansas City.

**South Greenfield Crushing Co.**, South Greenfield, Mo. C. A. Muench, Aurora, Mo.; James Logan, 1323 South Garrison St., Carthage, Mo. Rock crushing.

**General Building Products Co.**, Biltmore, N. C., $100,000. R. W. Howell, Hayden Grindstaff, S. G. Bernard, all of Asheville, N. C. Manufacture stone products, plaster, etc.

**Hinsdale Sand and Gravel Co.**, Hinsdale, Mass., 200 shares, no par. L. Harry Braque, president; Jane S. Bazette, treasurer; Milton H. Bazette, Hinsdale.

**Southern Gravel Co.**, Houston, Tex. To produce sand and gravel. President, A. C. Kater; vice-president, A. D. Alderson; D. W. Berry, secretary-treasurer.

**Consolidated Oka Sand and Gravel Co., Ltd.**, Montreal, Que., 50,000 shares common stock, no par value, and 10,000 shares preferred stock, $100 par value.

**Aerocrete Ontario, Ltd.**, Hamilton, Ont., 1000 shares preferred stock at $100 each and 1000 shares common, no par value. To manufacture concrete blocks, artificial stone, etc.

## Quarries

**Hoppendeitsal Construction Co.**, Macon, Ga., has purchased the E. H. France quarry near Sparta, Ga., which will be reopened at once.

**W. F. and John E. Hershberger**, Lander, Wyo., formerly of Salida, Colo., and Howard Crispin, of Lander, have opened a granite quarry in the Big Popo Aigre river canyon, near Lander.

**Marble Cliff Quarries Co.**, Columbus, Ohio, has purchased 81.178 acres of land in Franklin township from the Columbus Stone Co., according to a deed filed. The Marble Cliff company gave a mortgage for $165,000, payable at $33,000 a year, without interest.

**Stowe Trap Rock Co.**, Pottstown, Penn.; more than six tons of dynamite were used in a blast on September 1. It is estimated that 85,000 tons of stone were dislodged by the blast, but so well calculated was the explosion that spectators stood at points of vantage near by and they were in no danger from flying fragments. Sixteen holes 60 ft. in depth were drilled in the face of the quarry. The holes were about 40 ft. apart. In each hole about 750 lb. of dynamite were placed.

**Blubber Bay, B. C.**—The first load of limestone for the new Grays Harbor Pulp Co. plant came in recently from Blubber Bay, B. C., in tow of the Puget Sound tug **Martha Foss.** The first shipment comprised approximately 500 tons, according to officials of the Twin Harbors Stevedoring Co., which handled the big barge here. The limestone shipment is expected to be the first of a regular service between the British Columbia quarrying plant and the big pulp mill, which is to go into production in the immediate future. The plant will use large quantities of limestone in its operations and according to information here will bring all its rock in by water.

## Sand and Gravel

**Cavalier, N. D.**; Pembina county commissioners have purchased seven acres for a gravel-pit operation.

**Lyman-Richey Sand and Gravel Co.**, Omaha, Neb., is reported to have abandoned operations at the Ehernberger pit, Schuyler, Neb., and to have dismantled the plant.

**Le Mars, Iowa**; county supervisors have purchased a gravel pit. The market value of the land is to be paid plus 16⅔c. per cu. yd. for the material removed.

**Coast Construction Co.**, Olympia, Calif., has started work on a sand and gravel plant. Bailey Hipkin is president and Elmer Whittaker, vice-president. Connection to the plant is being made by the Southern Pacific railroad.

**Gadsden Sand and Gravel Co.**, Gadsden, Ala., has been operating its plant day and night for several days. Among the projects being furnished with material are rayon mills under construction at Rome, Ga., and Lewisburg, Tenn., and three large highway projects in Tennessee.

## Cement

**Idaho Portland Cement Co.**, Pocatello, Idaho, announces work will start on new plant this month. J. B. Maxfield is superintendent.

**Texas Portland Cement Co.** announces a reduction in the price of cement at Dallas, Tex., of 20c. per bbl., and at Houston of 10c., to assist dealers in meeting the competition of imported Belgian cement.

**Superior Portland Cement Co.**, Concrete, Wash., was host to the members of the Tacoma, Wash., Builders' Exchange, and the Engineers' and Architects' Association on August 25 and 26. The program included inspection of the cement plant and of the Diablo dam project.

**British Columbia Cement Co.**, Victoria, B. C., is doing exploration work on its property on the northeast end of Texada Island, preparatory to commencing quarrying limerock. The company is applying for a foreshore lease and a license for water.

**Lawrence Portland Cement Co.**, Siegfried, Penn., has recently begun the installation of a set of "Norblo" dust-collecting units at its plant near Rockland, Me., to eliminate the dust thrown off by the pulsation of the air blast at the firing end of the kilns.

**Olympic Portland Cement Co.**, Bellingham, Wash.; a railway switching accident wrecked a company locomotive and two gondola cars on August 25. The train crew escaped injury by jumping. The accident was a collision between the cement company's train of eight loaded coal cars and a Great Northern Ry. train of 18 empty cars.

**Huron Portland Cement Co.**, Detroit, Mich., has about completed its 150,000-bbl. storage and packing plant at Buffalo, N. Y. The plant is equipped to receive bulk cargoes by boat from Alpena, Mich.

**Superior Portland Cement Co.**, Concrete, Wash.; C. L. Wagner, superintendent, has announced two changes in the local office force of the company, in which two young men are given deserved promotion. Kenneth S. Childs, assistant traffic manager, was advanced to the job of traffic manager with his office in Seattle. He will succeed J. B. Loughary, who has been promoted to the sales department. Howard Carleton, who has been employed in the laboratory and has been assisting Mr. Childs, has been selected to take over the duties of assistant traffic manager. Mr. Childs started work for Superior in 1923, his first work being in the sack department, and was made foreman of the sack house in May, 1924. He was placed in charge of the traffic department on the death of R. M. Dubigk, and has made good on the job. In addition to his other duties, he has been editor of the Superior "Siren" since it was started in June, 1927. Howard Carleton started his work with Superior in the sack department in May, 1927, being transferred to the laboratory early this year. Mr. Carleton will also take over the task of editing the "Siren," so will have all the work a young man can handle. It is reported the changes were effective September 1.

## Cement Products

**Mercedes Concrete and Pipe Co.**, Mercedes, Texas, will erect a $25,000 branch plant at McAllen, Texas.

**Sloss-Sheffield Co.**, Birmingham, Ala., have established another ready-mixed concrete plant in that city and are distributing the product in trucks operated by the company.

**V. E. Schevenell**, Memphis, Tenn., will move his concrete products factory to a new site on Walker Avenue in Memphis, to comply with the zoning ordinance regarding the property on which the present plant is located.

## Gypsum

**United States Gypsum Co.**, Chicago, has opened a district office in Omaha, Neb., which will serve the Middle West states, including Iowa, with products from the company's plants at Fort Dodge, Laramie, Wyo., and Loveland, Colo. R. W. Tompkins is district manager.

**National Gypsum Co.**, Buffalo, N. Y., is reported in local Ohio newspapers to have paid in the neighborhood of $500,000 for the property of the Luckey Lime and Supply Co., Luckey, Ohio. It is also reported that the lime plant will be enlarged. The Luckey office has been closed.

**United States Gypsum Co.**, Chicago, Ill., has transferred its mid-southern sales office from Chicago to Memphis, Tenn., Bank of Commerce building. Frank Miller, district manager, will be in charge of the Memphis office. Office workers will come from Chicago. The new office will serve west Tennessee, Alabama, Mississippi, Louisiana, Arkansas and Kentucky. Gypsum commodities will be distributed from the company's mills at nearby points. The district office at Atlanta, Ga., has also been enlarged, with J. B. McCorkle, district manager, in charge. The Atlanta office will serve Georgia, Florida, North Carolina, South Carolina and eastern Tennessee with gypsum commodities from the company's manufactories at Plasterco, Va., and other points. A majority of the office assistants transferred to the Atlanta office were from headquarters.

## Agricultural Limestone

**J. A. Schultz and J. M. Schultz** have opened their lime plant at Jacques Spur, Idaho. They are specializing on agricultural limestone, and they state that they are now able to sell their pulverized limestone direct to farmers and gardeners at a price they can afford to pay. They state that their product is 97% calcium carbonate.

**Hayesville, N. C.**; on August 14, subscribers for stock in the organization to buy and operate a stone crusher to crush limestone for farmers of this section met at the courthouse and elected directors as follows: W. T. Bumgarner, E. C. Meace, H. C. Moore, A. F. Padgett and F. O. Scroggs. On August 22 a number of men and teams started work opening up a quarry on the old church property one and one-half miles north of Brasstown Postoffice.

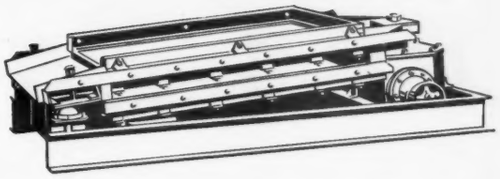
# ROTEX

## Compare it, POINT *for* POINT—

### *with any other Screen you know!*

**ROTEX Heavy Duty Screen No. 14 with one deck 4 ft. by 8 ft.**

SO far as *design* is concerned, there can be no true comparison. There is no other screen like the ROTEX. Yet in all details of design and construction the ROTEX will stand the closest kind of inspection. It is in operating efficiency, capacity and accuracy that the ROTEX clearly excels—thus demonstrating the soundness of its fundamental principles. We invite you to pass judgment on the fair basis of performance — and venture the prophesy that ROTEX will lose nothing by the comparison.



**ROTEX Heavy Duty Screen No. 18 with two decks, each 4 ft. by 6 ft.**

The ROTEX Heavy Duty Series was designed especially for the severe service ordinarily encountered in pit, mine and quarry work. These screens are exceptionally sturdy units with large screening areas, require very little head room, are waterproof, dust-proof, and as well adapted to sprays, or dewatering, as to dry screening.

These characteristics, which make ROTEX Screens readily adaptable to a wide range of screening conditions, have caused them to be installed in a large number of varying type plants.

The fundamental principles of ROTEX design have been tested by years of successful operation. Exclusive features such as the *nearly level screen surface;* the *ball-and-bevel-strip* mesh cleaning system and others have proven their practical value many times over. And don't forget—these features, or anything like them—are not to be had in any other screen on the market today.

The
ORVILLE SIMPSON COMPANY
Office and Factory
1221 KNOWLTON ST. CINCINNATI. OHIO

*When writing advertisers, please mention ROCK PRODUCTS*

*The Only Paid Circulation Covering the Rock Products Industry*

# Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Entered as second-class matter, July 2, 1907, at the Chicago, Ill., postoffice under the Act of March 3, 1879. Copyrighted, 1928, by Tradepress Publishing Corporation.

## *Contents for September 29, 1928*

**New Sand and Gravel Dredging Operation in Chicago Metropolitan Territory** ..... 33-38
*Morton Sand and Gravel Co., Wayne, Ill., uses sump method of dewatering its pump discharge.*
**An American Pozzolana and Its Effect on Portland Cement Concrete** ..... 39-44
*Pumicite—a volcanic ash found in Kansas and how it is being exploited. By Dr. E. Lee Heindenreich.*
**Exploitation of High Silica Rocks** ..... 45, 46
*Variety and uses of rocks containing 95% or more of silica. By Prof. P. G. H. Boswell.*
**Scientific Merchandising of Concrete Aggregates** ..... 47-50
*A comprehensive discussion of methods of selling aggregates through comparison of whole construction costs. By Stanley M. Hands.*
**Lime Burning Practice Based on European and American Observations** ..... 51-55
*Part X—Rock handling at German lime plants—Ring kilns. By Victor J. Azbe.*
**British Research on Pozzolanas** ..... 56-59
*A largely neglected industry in the United States.*
**Mortar—Its Importance in the Life of Brickwork** ..... 60-62
*A chance for research in the lime industry. By Prof. J. A. Van der Kloes.*
**Natural Cement of Vassy** ..... 63, 64
*Properties that might well be sought for in portland cement.*
**Digest of Literature on Nature of Setting and Hardening Process in Portland Cement** ..... 65-68
*Part VI—The chemical significance of rate of set. By R. H. Bogue.*
**Health of Cement Plant Workers** ..... 77, 78
*By A. J. R. Curtis.*
**Portland Cement Statistics for August** ..... 86, 87

## *Departments*

**Book Reviews** ..... 70, 71
**Hints and Helps for Superintendents** ..... 72, 73
**Editorial Comment** ..... 79
**Financial News** ..... 80, 81
**Foreign Abstracts and Patent Review** ..... 84, 85
**Traffic and Transportation News** ..... 88, 89
**Cement Products** ..... 91-93
**Current Prices of Rock Products** ..... 94-98
**New Machinery and Equipment** ..... 100, 101
**News of the Industry** ..... 74, 83, 84, 90, 99, 102, 104
**Classified Index of Advertisers** ..... 110-116

TRADEPRESS PUBLISHING CORPORATION
542 South Dearborn Street, Chicago, Illinois, U. S. A.
W. D. CALLENDER, *President*
N. C. ROCKWOOD, *Vice-President* C. O. NELSON, *Secretary*

LONDON OFFICE: Dorland House, Mezzanine Floor, 14 Regent St., S. W. I.

NATHAN C. ROCKWOOD, *Editor and Manager*
EDMUND SHAW, Los Angeles, Calif., *Contributing Editor*
HORATIO M. FITCH, *Associate Editor*
WALTER B. LENHART, *Associate Editor*
A. M. STERN, *Assistant Editor*
R. W. ANDERSON, *Manager, Research and Service Dept.*
E. A. SINE, *Production Manager*
GLENN BEAVERS, *Manager, Advertising Copy Department*

SUBSCRIPTION—Two dollars a year to United States and Possessions. Three dollars a year to Canada and foreign countries. Twenty-five cents for single copies

GEORGE M. EARNSHAW, *Eastern Manager*
FRED S. PETERS, *Eastern Representative*
280 Madison Ave., New York City. Tel. Caledonia 4474
WALTER E. EDWARDS, *Central Advertising Manager*
803 Leader Bldg., Cleveland. Tel. Main 4056
RALPH C. SULLIVAN, *Advertising Manager*
W. A. WILSON, J. M. COX, *Western Representatives*
Chicago. Tel. Wabash 3714-3715

TO SUBSCRIBERS—Date on wrapper indicates issue with which your subscription expires. In writing, to have address changed, give old as well as new address

*The A. B. P. is a nonprofit organization whose members have pledged themselves to a working code of practice in which the interests of the men of American industry, trade and professions are placed first—a code demanding unbiased editorial pages, classified and verified paid subscribers, and honest advertising of dependable products. The A. B. C. is an organization which audits and verifies publishers' circulation claims and records.*